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ABSTRACT

These materials for a five-unit course were developed to introduce secondary and postsecondary students to the telecommunications process and its impact on society. Units cover the following topics: orientation to telecommunications; telecommunications hardware; telecommunications software; methods of transmission; and applications. The first section is designed to show teachers how to use the materials and includes an explanation of instructional elements, an instructional task analysis for each unit, and a glossary. Twenty-two references, a list of 15 supplementary materials, including computer software, and a resource list also appear. The instructional elements for the units include objectives, suggested activities, information sheets. transparency masters, assignment sheets, handout sheets, tests, and test answers. Some elements, such as the information sheets, include diagrams and line drawings. (CML)

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Introduction to Telecommunications

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INTRODUCTION TO TELECOMMUNICATIONS

Written by

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Edited by

Jane Huston

Developed by

The Mid-America Vocational Curriculum Consortium, Inc.

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INTRODUCTION TO TELECOMMUNICATIONS

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FOREWORD

The wide acceptance and use of telecommunications in today's workplace and the resulting need for students to become more aware of these technologies has prompted the Mid-America Vocational Curriculum Consortium to develop *Introduction to Telecommunications*.

Designed to supplement a typical vocational program at either the secondary or postsecondary level, this publication introduces the student to the telecommunication process and its impact on society.

As this material is used, it is hoped that the student will be able to fill a broader role in their chosen occupation. Every effort has been made to make this publication basic, readable, and by all means, usable. Three vital parts of instruction have been intentionally omitted from the publication: motivation, personalization, and localization. These areas are left to the individual instructors who should capitalize on them. Only then will this publication become a vital part of the teaching-learning process.

Harley Schlichting, Chairman
Board of Directors
Mid-America Vocational
Curriculum Consortium

Greg Pierce
Executive Director
Mid-America Vocational
Curriculum Consortium

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Appreciation is extended to those individuals who contributed their time and talent to the development of *Introduction to Telecommunications.*

The contents of this publication were planned and reviewed by:

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USE OF THIS PUBLICATION

Instructional Units

Introduction to Telecommunications contains five units of instruction. Each instructional unit includes some or all of the basic components of a unit of instruction; performance objectives, suggested activities for teachers and students, information sheets, assignment sheets, job sheets, visual aids, tests, and answers to the tests. Units are planned for more than one lesson or class period of instruction.

Careful study of each instructional unit by the teacher will help to determine:

A. The amount of material that can be covered in each class period
B. The skills which must be demonstrated

   1. Supplies needed
   2. Equipment needed
   3. Amount of practice needed
   4. Amount of class time needed for demonstrations

C. Supplementary materials such as pamphlets or filmstrips that must be ordered
D. Resource people who must be contacted

Objectives

Each unit of instruction is based on performance objectives. These objectives state the goals of the course, thus providing a sense of direction and accomplishment for the student.

Performance objectives are stated in two forms: unit objectives, stating the subject matter to be covered in a unit of instruction; and specific objectives, stating the student performance necessary to reach the unit objective.

Since the objectives of the unit provide direction for the teaching-learning process, it is important for the teacher and students to have a common understanding of the intent of the objectives. A limited number of performance terms have been used in the objectives for this curriculum to assist in promoting the effectiveness of the communication among all individuals using the materials.

Reading of the objectives by the student should be followed by a class discussion to answer any questions concerning performance requirements for each instructional unit.

Teachers should feel free to add objectives which will fit the material to the needs of the students and community. When teachers add objectives, they should remember to supply the needed information, assignment and/or job sheets, and criterion tests.

Suggested Activities for the Instructor

Each unit of instruction has a suggested activities sheet outlining steps to follow in accomplishing specific objectives. Duties of instructors will vary according to the particular unit; however, for best use of the material they should include the following: provide students with objective sheet, information sheet, assignment sheets, and job sheets; preview filmstrips, make transparencies, and arrange for resource materials and people; discuss unit and specific objectives and information sheet; give test. Teachers are encouraged to use any additional instructional activities and teaching methods to aid students in accomplishing the objectives.

Information Sheets

Information sheets provide content essential for meeting the cognitive (knowledge) objectives in the unit. The teacher will find that the information sheets serve as an excellent guide for presenting the background knowledge necessary to develop the skill specified in the unit objective.

Students should read the information sheets before the information is discussed in class. Students may take additional notes on the information sheets.

Transparency Masters

Transparency masters provide information in a special way. The students may see as well as hear the material being presented, thus reinforcing the learning process. Transparencies may present new information or they may reinforce information presented in the information sheets. They are particularly effective when identification is necessary.

Transparencies should be made and placed in the notebook where they will be immediately available for use. Transparencies direct the class's attention to the topic of discussion. They should be left on the screen only when topics shown are under discussion.

Assignment Sheets

Assignment sheets give direction to study and furnish practice for paper and pencil activities to develop the knowledge which is a necessary prerequisite to skill development. These may be given to the student for completion in class or used for homework assignments. Answer sheets are provided which may be used by the student and/or teacher for checking student progress.

Job Sheets

Job sheets are an important segment of each unit. The instructor should be able to demonstrate the skills outlined in the job sheets. Procedures outlined in the job sheets give direction to the skill being taught and allow both student and teacher to check student progress toward the accomplishment of the skill. Job sheets provide a ready outline for students to follow if they have missed a demonstration. Job sheets also furnish potential employers with a picture of the skills being taught and the performances which might reasonably be expected from a person who has had this training.

Test and Evaluation

Paper-pencil and performance tests have been constructed to measure student achievement of each objective listed in the unit of instruction. Individual test items may be pulled out and used as a short test to determine student achievement of a particular objective. This kind of testing may be used as a daily quiz and will help the teacher spot difficulties being encountered by students in their efforts to accomplish the unit objective. Test items for objectives added by the teacher should be constructed and added to the test.

Test Answers

Test answers are provided for each unit. These may be used by the teacher and/or student for checking student achievement of the objectives.

INTRODUCTION TO TELECOMMUNICATIONS

INSTRUCTIONAL/TASK ANALYSIS

PRACTICAL APPLICATION: What The Student Should Be Able to Do (Psychomotor)	RELATED INFORMATION: What the Student Should Know (Cognitive)
UNIT I: ORIENTATION	
	1. Terms and definitions
	2. History of telecommunications
	3. Applications of telecommunications
	4. Questions concerning the impact of telecommunications
5. Research a career in telecommunications	
6. Develop a scrapbook of telecommunication items	
UNIT II: HARDWARE	
	1. Terms and definitions
	2. Types of telephone hardware
	3. Types of computers
	4. Types of peripheral devices
	5. Types of video equipment
	6. Characteristics of networking systems
7. Research a new piece of hardware	
8. Prepare a poster showing types of telecommunication hardware	

PRACTICAL APPLICATION: What The Student Should Be Able To Do (Psychomotor)	RELATED INFORMATION: What the Student Should Know (Cognitive)
UNIT III: SOFTWARE	
	1. Terms and definitions
	2. Types of computer operating systems software
	3. Characteristics of a telephone operating system
	4. Types of business software
	5. Types of audiovisual software
6. Research software currently being used in business and industry	
7. Match types of business software with their applications	
8. Determine the types of videotapes available in video stores	
UNIT IV: METHODS OF TRANSMISSION	
	1. Terms and definitions
	2. Analog and digital transmission
	3. Three modes of transmission
	4. Speeds of transmission
	5. Transportation systems
6. Survey businesses in your community to determine their use of telecommunications	
7. Design a networking system to transmit data within your school	

PRACTICAL APPLICATION: What The Student Should Be Able To Do (Psychomotor)	RELATED INFORMATION: What the Student Should Know (Cognitive)
UNIT V: APPLICATIONS	
	1. Types of data communications
	2. Video communications
	3. Types of audio communications
	4. Graphic communications
5. Develop a message for voice mail	
6. Develop an electronic mail message	
7. Set up a conference call	

INTRODUCTION TO TELECOMMUNICATIONS

GLOSSARY

Analog — A form of transmission over communication channels in a continuous waveform

Bandwidth (also known as grade) — The range or width of the frequencies available for transmission on a given channel

Baud — Unit used to measure transmission speeds

Bus configuration — Each computer plugs into a single bus cable that runs from workstation to workstation

Channel — Path for transmission of signals between two or more points

Central office — Centralized switching site which allows communications between two or more locations

Circuit — The connection which enables the customer to access common user and/or private line telecommunication services

Coaxial cable — Insulated hollow copper cylinder containing a signal wire conductor to transmit data

Communication software — Programs that assist in the transfer of information across communication channels by convincing the computer to act as if the microcomputer was a terminal and a part of the communication system

Computer operating systems — Programs that control the operation of the computer system

Data base management systems — Programs that serve as the interface between the data base and the programmer, operating system, and users

Digital — A form of transmission over communication channels in a series of on/off pulses

Download — To receive a file from another computer

Fiber optics — Tiny threads of glass used to transmit light pulses

Fully distributed network configuration — One in which every set of nodes in the network can communicate directly with every other set of nodes through a single communication link

Hardware — Physical components which make up a system

Hierarchical configuration — Network design for multiple CPU's, in which an organization's needs are divided into multiple levels that receive different levels of computer support

Impact printer — Printer that forms characters by physically striking a ribbon against paper

Integrated software — Two or more application programs which work together to allow easy movement of data between the applications

Links — The transmission channels which connect the nodes such as telephone lines and coaxial cables

Local-area networks — Operate within a well-defined and generally self-enclosed area

Modem — A device used to translate signals from analog to digital or digital to analog

Node — Refers to the entry/exit points of a network and consists of CPU's, printers, terminals, and/or other physical devices

Non-impact printer — The use of heat, laser technology, or photographic techniques to print output

PBX — Local telephone switch which serves stations within a company and accesses the public network

Remote networks — Cover large, geographically dispersed areas and are used mostly by large volume users due to cost

Ring configuration — Network design in which a number of computers are connected by a single transmission line in a circle

Software — Program or programs used to direct a system

Spreadsheet — Programs that create a table fo data and allow any piece(s) of data to be defined mathematically in terms of any other data within the table

Star configuration — Network design in which all transactions must go through a central computer prior to being routed to the appropriate network computer

Telecommunication — Transmission of voice, data, and video through electronic means

Transponder — Receiver/transmitter combination that retransmits a received signal greatly amplified

Twisted pair — Two insulated copper wires twisted into pairs, used to transmit signals

Upload — To send a file from one computer to another

Word processor — Programs that perform text-editing functions

REFERENCES

(NOTE: An alphabetical list of references used in developing this text, a list of suggested supplemental materials, and a resource list may be found in Unit I, Suggested Activities.)

ORIENTATION
UNIT I

UNIT OBJECTIVE

After completion of this unit, the student should be able to define telecommunications, list applications of telecommunications, and describe the impact of telecommunications on society. Competencies will be demonstrated by completing the assignment sheets and the unit test with a minimum score of 85 percent.

SPECIFIC OBJECTIVES

After completion of this unit, the student should be able to:

1. Match terms related to telecommunications with their correct definitions.
2. Match dates related to the history of telecommunications with their correct events.
3. List applications of telecommunications.
4. List questions concerning the impact of telecommunications.
5. Research a career in telecommunications. (Assignment Sheet #1)
6. Develop a scrapbook of telecommunication items. (Assignment Sheet #2)

ORIENTATION
UNIT I

SUGGESTED ACTIVITIES

A. Obtain additional materials and/or invite resource people to supplement/reinforce information provided in this unit of instruction.

(NOTE: This activity should be completed prior to the teaching of this unit.)

B. Provide students with objective sheet.

C. Discuss unit and specific objectives.

D. Provide students with information and assignment sheets.

E. Discuss information and assignment sheets.

F. Integrate the following activities throughout the teaching of this unit:

1. Locate a film on the history of telecommunications. Contact your local telephone company or your local chapter of The Telephone Pioneers of America.

2. Ask a representative from the telecommunications industry (telephone, computer, satellite, cable TV) to discuss the history of telecommunications, current trends, and careers in telecommunications.

3. Ask a panel of business people using telecommunications in their business to share uses of telecommunications with your class.

4. Discuss how telecommunications shock affects workers, i.e. fear of being replaced by a machine.

5. Discuss past, present, and future changes as a result of telecommunication technology. Have students visit with individuals over 60 who can tell them about the changes they have seen as a result of new technology.

6. Discuss how telecommunication affects and impacts on current events.

   EXAMPLES: Election results — Reporting over the years
   World disasters — Shuttle disaster in U.S., Chernobyl in Soviet Union; how quickly events are reported to world

7. Have students compile a list of careers in telecommunications, including job titles, descriptions, requirements, qualifications, skills, salaries, etc.

   (NOTE: Refer to *Occupational Outlook Handbook* or *Bulletin Board of Careers*.)

8. Meet individually with students to evaluate their progress through this unit of instruction, and indicate to them possible areas for improvement.

G. Give test.

H. Evaluate test.

I. Reteach if necessary.

REFERENCES USED IN DEVELOPING UNITS OF INSTRUCTION

(NOTE: The following references were used in developing the five units of instruction which are included in *Introduction to Telecommunications*. Refer to this list when selecting supplemental materials for your students.)

A. "Applications Software Today". Peterborough, New Hampshire: *Byte*, Volume 12, Number 7, Summer 1987.

B. *The Basics Book of Data Communications*. Mansfield, Massachusetts: Codex.

C. Benjamin, Robert I.; Rockart, John F.; Morton, Michael S. Scott; and Wyman, John. *Information Technology: A Strategic Opportunity*. Cambridge, Massachusetts: Sloan Management Review, Spring, 1984.

D. Brightman, Richard W. and Dimsdale, Jeffrey M. *Using Computers in an Information Age*. Albany, New York: Delmar Publishers Inc., 1986.

E. Brooks, John. *Telephone The First Hundred Years*. New York, New York: Harper & Row Publishers, 1976.

F. "Business Communications: A Special Report". Cleveland, Ohio: *Modern Office Technology*, Penton Publication, September, 1987.

G. "Computer Conferencing". Peterborough, New Hampshire: *Byte*, Volume 10, Number 13, December, 1985.

H. Clark, James F. and White, Kathy Brittain. *Computer Confidence: A Challenge for Today*. Cincinnati, Ohio: South-Western Publishing Co., 1986.

I. Gayeski, Diane M. *Corporate and Instructional Video Design and Production*. Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1983.

J. Glossbrenner, Alfred. *Personal Computer Communications*. New York, New York: St. Martin's Press, 1985.

K. Housel, Thomas J. and William E. Darden III. *Introduction to Telecommunications: The Business Perspective*. Cincinnati, OH: South-Western Publishing Co., 1988.

L. Mandell, Steven L. *Computers and Data Processing Today*. St. Paul, Minnesota: West Publishing Company, 1986.

M. *Introduction to Local Area Networks*. Digital Equipment Corporation, 1982.

N. Martin, James. *Telecommunications and the Computer*. Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1976.

O. Merritt, John A. "PBX: The Network Switch". *P C World*. San Francisco, California: P C World Communications, Inc., October, 1985.

P. *Minnesota Technology Resource Notebook*. St. Paul, Minnesota: Telecommunications Development Center, Minnesota Extension Service, University of Minnesota, September 1986.

REFERENCES USED IN DEVELOPING UNITS OF INSTRUCTION

Q. Oliverio, Mary Ellen and Pasewark, William R. *Office Procedures and Technology*. Cincinnati, Ohio: South-Western Publishing Co., 1986.

R. Stahr, Lisa B. "Tactics for Teleconferencing". *P C World*. San Francisco, California: P C World Communications, Inc., May 1985.

S. *Telecommunications and You*. Los Angeles, California: IBM Telecommunication Education in conjunction with Morehead and Company, 1986.

T. *Telecommunications Source Book*. Washington, DC: North American Telecommunications Association, 1986.

U. Trainor, Timothy N. *Computer Literacy Concepts and Applications*. Santa Cruz, California: Mitchell Publishing, Inc., 1984.

V. Utz, Peter. *Video User's Handbook*. Second Edition. Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1982.

SUGGESTED SUPPLEMENTAL MATERIALS

Telecommunication Simulators

(NOTE: Telecommunications simulators are now available for educators from the elementary level through the post-secondary level. The list below provides descriptions of current products on the market.)

A. THE ELECTRONIC VILLAGE is a site-licensed simulation and tutorial introduction to telecommunications and bulletin board systems. Also comes with materials in telecommunications ethics. Exsym, 2728 23rd Street, Greeley, CO 80631; (303) 330-8021.

B. THE ELECTRONIC MAILBAG is an electronic mail simulator with a complete curriculum. Multi-boot permission is granted for up to three computers. Exsym (see above address).

C. WINDOW ON TELECOMMUNICATIONS is a unique site-licensed telecommunications vocabulary simulator. Exsym.

D. GBBS "PRO" is actually one of the most sophisticated Apple-based bulletin board software packages on the market. One of its many features uses what is called a "local driver" or "modemless" driver. The driver allows GBBS "PRO" to function without a modem, enabling it to act as a live simulator or functional classroom message center. Later, the system can be hooked up to a modem and phone line, and students can actually go online. Micro Data Products, 537 Olathe Street, Unit G, Aurora, CO 80011; (303) 360-6200.

E. INFORMATION CONNECTION is a package which simulates an on-line information search using a limited version of the Grolier online encyclopedia currently available on CompuServe. Grolier Electronic Publishing, Sherman Turnpike, Danbury, CT 06816; (203) 797-3756 or (800) 858-8858.

SUGGESTED SUPPLEMENTAL MATERIALS

Educational Software Packages with Telecommunications Capabilities

A. The Other Side — Tom Snyder Productions
123 Mt. Auburn St.
Cambridge, MA 02138
(617) 876-5841

B. NEWSROOM — Springboard
7808 Creekridge Circle
Minneapolis, MN 55435
(612) 944-3912

C. WRITE AWAY — Peregrine Software
1160 Appleseed Lane
St. Louis, MO 63132
(314) 997-2369

D. Word Juggler — Quark
2525 W. Evans, Suite 220
Denver, CO 80219
(303) 934-2211

E. Pro-COM-A — Prometheus
4545 Cushing Parkway
Fremont, CA 94538
(415) 490-2370

Bulletin Board Software — Public Domain

A. RBBS (IBM and compatibles)

B. WAPBBS (Apple)

C. MACE (Atari)

Beginning Books

A. Glossbrenner, A. *The Complete Handbook of Personal Computer Communications*. New York: St. Martin's Press, 1985.

B. Glossbrenner, A. *How to Look It Up On-Line*. New York: St. Martin's Press, 1986.

RESOURCE LIST

Periodicals

(NOTE: The following is an alphabetical list of publications which may be beneficial as supplemental teaching aids and reference materials and can be obtained by writing to the addresses below.)

Administrative Management
The Automated Office, Ltd.
P.O. Box 7624
Teaneck, NJ 07666

Apple Orchard
908 George Street
Santa Clara, CA 95050
9 issues/year. Apple users only. News, software tips included.

Byte
70 Main Street
Peterborough, NH 03458
Monthly technical magazine. Detailed descriptions of hardware, construction articles, in-depth reviews.

Call A.P.P.L.E.
304 Main Street, Suite 300
Renton, WA 98055
7 issues/year. Apple users only. News, hardware tips, programs.

Classroom Computer News
P.O. Box 266
Cambridge, MA 02138

Compute!
P.O. Box 5406
Greensboro, NC 26403
Monthly. For Atari, Commodore, or Apple users only. Good tutorial approach, many programs, software tips.

Computer Decisions
Hayden Publishing Co., Inc.
10 Mulholland Drive
Hasbrouck Heights, NJ 07604

Computers & Electronics
One Park Avenue
New York, NY 10016
Monthly. Many do-it-yourself hardware projects. Continuing coverage of audio, consumer electronics.

Computerworld
International Data Corporation
60 Austin Street
Newton, MA 02160

The Computing Teacher
International Council for
Computers in Education
c/o Department of Computer and
Information Science
University of Oregon
Eugene, OR 97403

Computronics
50 North Pascack Road
Spring Valley, NY 10977

Creative Computing
39 E. Hanover Ave.
Morris Plains, NJ 07950
Monthly. For Apple, Atari, Radio Shack, IBM, and Commodore users. Evaluations and applications for home and school.

Creative Computing Buyer's Guides
39 E. Hanover Ave.
Morris Plains, NJ 07950
Two per year. Spring: Software Guide. Fall: Guide to Computers and peripherals.

Desktop Computing
P.O. Box 997
Farmingdale, NY 11737

EC & TJ (Educational and Technology Journal)
Association for Education Communications and Technology
1126 16th Street, NW
Washington, D.C. 20036

Educational Computer Magazine
P.O. Box 535
Cupertino, CA 95015
Bi-monthly. Success stories, how-to classroom applications, reviews.

RESOURCE LIST

Educom Bulletin
Interuniversity Communications Council
Box 364, Rosedale Road
Princeton, NJ 08540

Electronic Classroom
TEC
150 West Carob Street
Compton, CA 90220

Electronic Learning
902 Sylvan Avenue
Englewood Cliffs, NJ 07632
8 issues/year. Published by Scholastic. Lots of teacher contributions and reviews.

Infoworld: The Newsweekly for Microcomputer Users
530 Lytton
Palo Alto, CA 94301

Instructional Innovator
1126 16th Street N.W.
Washington, D.C. 20036
Monthly. Covers audio visual, computers, and other related technology for schools.

Interface Age
16734 Marquardt Ave.
Cerritos, CA 90701
Monthly. Has moved toward primarily a business orientation. Good comparison charts of hardware and software.

Journal of Computer-Based Instruction
Association for Development of Computer-Based Instructional Systems
8120 Perm Avenue, South
Bloomington, MN 55431

Journal of Computers in Mathematic and Science Teaching
P.O. Box 4455
Austin, TX 73765

Journal of Data Education
Society of Data Educators
516 Mark Avenue
Truth or Consequences, NM 87901

Media & Methods
1511 Walnut Street
Philadelphia, PA 19102
9 issues/year. Aimed at elementary/secondary schools; covers audio/video as well as computers.

Microcomputer Index
2464 El Camino Real #247
Santa Clara, CA 95051
Quarterly. One-line descriptions of all articles, reviews, and programs in 39 magazines.

Microcomputing
80 Pine Street
Peterborough, NH 03458

Microcomputer Applications
International Society for Mini and Microcomputers
Acta Press
Box 2481
Anaheim, CA 92804

MicroDiscovery
P.O. Box 7500
Bergenfield, NJ 07621
Monthly. For beginners. Articles, tutorials, news. Very low level and non-technical.

MicroSIFT News
Northwest Regional Educational Laboratory
300 S.W. Sixth Avenue
Portland, OR 97204

Modern Office Technology
P.O. Box 91368
Cleveland, OH 44101

PC
39 East Hanover Avenue
Morris Plains, NJ 07950
Monthly. IBM Personal computer and clones. Huge magazine with articles, reviews of peripherals and software.

RESOURCE LIST

PC World
555 DeHaro Street
San Francisco, CA 94107
Monthly. IBM personal computer only. Articles, stories, reviews about IBM PC and look-alikes.

Personal Computing
50 Essex Street
Rochelle Park, NJ 07662
Monthly. Business orientation with some items for home and education. Many articles and success stories. Some reviews.

Personal Software
Hayden Publishing Co., Inc.
50 Essex Street
Rochelle Park, NJ 07662
Monthly. News, reviews.

Popular Computing
70 Main Street
Peterborough, NH 03458
Monthly. Orientation to beginners. Nice graphic presentation. Novice-level tutorials.

School Microwave Reviews
P.O. Box 246
Dresden, ME 04342
3 issues/year. Collection of software reviews for elementary/secondary level. Best of its kind. Publishes directory also.

Softside
6 South Street
Milford, NH 03055
Monthly. Program listings for TRS-80, Apple, and Atari. Somewhat inner directed with little outside advertising.

Softalk
11021 Magnolia Blvd.
North Hollywood, CA 91601
Monthly. Apple only. Cram full of articles, stories, reviews, programs, tutorials, hints.

Softalk for IBM Personal Computer
11021 Magnolia Blvd.
North Hollywood, CA 91601
Monthly. Programs, industry gossip, new product information.

Software Digest
EDP Services, Inc.
7620 Turtle Turnpike
Annadale, VA 22003

Software Review
Microform Review, Inc.
520 Riverside Drive
Westport, CT 06880

Softwarenews
Datapro Research Corp.
1805 Underwood Blvd.
Delran, NJ 08075

Today's Office
Hearst Business Publication
P.O. Box 11716
Philadelphia, PA 19101

80 Micro
80 Pine Street
Peterborough, NH 03458
Monthly. TRS-80 only. The bible for Radio Shack owners. Programs, tutorials, hardware hints, stories.

80-U.S. Journal
3838 South Warner Street
Tacoma, WA 98409
Monthly. TRS-80 only. Technical information, programs, reviews.

99'er
P.O. Box 5537
Eugene, OR 97405
Monthly. Texas Instruments only. Hints, programs, news, reviews.

RESOURCE LIST

Microcomputer and Educational Organizations

(NOTE: The following is an alphabetical list of organizations related to microcomputers and education which may be beneficial in obtaining reference materials.)

American Association of School Administrators
1801 North Moore Street
Arlington, VA 22209
(703) 528-0700

American Federation of Information Processing Societies, Inc.
1815 North Lynn Street
Arlington, VA 22209

American Society for Information Science
1155 16th Street, N.W.
Washington, D.C. 20036
(202) 659-3644

American Society for Training and Development
P.O. Box 5307
Madison, WI 53705

Apple for the Teacher
c/o Ted Terry
5848 Riddio Street
Citrus Heights, CA 95610

Association for Computer Users (ACU)
P.O. Box 9003
Boulder, CO 80301
(303) 443-3600

Association for Computing Machinery (ACM)
1133 Avenue of the Americas
New York, NY 10036
(212) 265-6309

Association for Educational Communications and Technology (AECT)
1126 16 Street, N.W.
Washington, D.C. 20036
(202) 833-4180

Association for Educational Data Systems (AEDS)
1201 16th Street, N.W.
Washington, D.C. 20036
(202) 833-4100

RESOURCE LIST

Association for the Development of Computer-Based Instructional Systems (ADCIS)
Bond Hall
Western Washington University Computer Center
Bellingham, WA 98225
(206) 676-2860

Association of School Business Officials in the U.S. and Canada
720 Garden Street
Park Ridge, IL 60068

Commission on Software Issues in the Eighties
c/o Daniel T. Brooks, Chairman
6106 Lorcom Court
Springfield, VA
(703) 569-6064

Computer-Based Education Research Laboratory
University of Illinois
Urbana, IL 61801

Computer-Using Educators
c/o W. Don McKell
Independence High School
1776 Educational Park Drive
San Jose, CA 95133

Council for Educational Development and Research
1518 K Street, N.W.
Suite 206
Washington, D.C. 20005

Datapro Research Company
1805 Underwood Blvd.
Delran, NJ 08075
(800) 257-9406

Educational Technology Center
University of California
Irvine, CA 92717
(714) 833-6911

EDUCOM
P.O. Box 364
Princeton, NJ 08540
(609) 734-1915

International Council for Computers in Education (ICCE)
Department of Computer and Information Science
University of Oregon
Eugene, OR 97403

RESOURCE LIST

Laboratory for Personal Computers in Education
State University of New York
Stony Brook, NY 11094
(516) 246-8418

Lawrence Hall of Science
University of California
Berkely, CA 94720
(415) 642-3167

Michigan Association for Computer Users in Learning (MACUL)
c/o Wayne County Intermediate School District
33500 Van Born Road
Wayne, MI 48184
(313) 326-9300

Micro Co-Op
P.O. Box 432
West Chicago, IL 60185
(312) 231-0912

MicroSIFT
Northwest Regional Educational Laboratory
500 Lindsay Building
710 2nd Avenue, S.W.
Portland, OR 91204
(503) 248-6974

Microcomputer Center
San Mateo Educational Resources Center Library
333 Main Street
Redwood City, CA 94063
(415) 363-5469

Microcomputer Education Applications Network
256 North Washington Street
Falls Church, VA 22046

Microcomputer Resource Center
Teachers College
Columbia University
New York, NY 10027
(212) 678-3740

Minnesota Educational Computing Consortium (MECC)
2520 Broadway Drive
St. Paul, MN 55113
(612) 376-1101

RESOURCE LIST

National Association of Computer Stores
3255 South U.S. 1
Fort Pierce, FL 33450
(305) 465-9450

Northwest Council for Computers in Education
Computer Center
Eastern Oregon State College
La Grande, OR 97850
(503) 963-2171

Society for Applied Learning Technology
50 Culpepper Street
Warrenton, VA 22816
(703) 347-0055

Texas Computer Education Association
7131 Midbury
Dallas, TX 75230
(214) 361-9472

ORIENTATION
UNIT I

INFORMATION SHEET

I. Terms and definitions

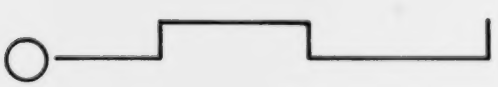
A. Analog — A form of transmission over communication channels in a continuous waveform

EXAMPLE: Human voice

B. Coaxial cable — Insulated hollow copper cylinder containing a signal wire conductor to transmit data

C. Digital — A form of transmission over communication channels in a series of on/off pulses

EXAMPLE: Turning on a light switch

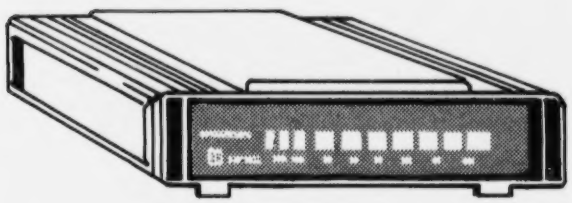


D. Fiber optics — Tiny threads of glass used to transmit light pulses

E. Hardware — Physical components which make up a system

INFORMATION SHEET

F. Modem — A device used to translate signals from analog to digital or digital to analog



G. PBX — Local telephone switch which serves stations within a company and accesses the public network

H. Software — Program or programs used to direct a system

I. Telecommunication — Transmission of voice, data, and video through electronic means

J. Twisted pair — Two insulated copper wires twisted into pairs, used to transmit signals

II. History of telecommunications

A. Communications before 1844

1. Smoke signals across the sky when there was no rain
2. Pounding of drums limited to a certain distance
3. Development of the weaving device which used punched cards to control the loom and patterns in the weave

B. 1844-78

1. Early telegraph started the communication process via an electrical wire path

INFORMATION SHEET

2. Analytical difference engine developed by Charles Babbage in 1850 which used two sets of punched cards for instructions

3. Invention of the telephone in 1876 by Alexander Graham Bell

C. 1878-1900

1. Vacuum tube was introduced

2. Transmission technological advances improved long distance transmissions through the development of copper twisted pair

3. Hollerith's data processing machine used punched paper and pins to do the 1890 United States Census

D. 1900-1960

1. In the 1920s, electronic experiments led to transmission of pictures

2. Coaxial cable was introduced

3. The impact of the transistor, introduced in 1947, led to the development of systems which were smaller and more powerful

4. World War II led to a great deal of research and development of radio telecommunications systems

   EXAMPLES: AM, FM, UHF, shortwave

5. Voice, data and video transmission over microwave radio relay systems was introduced by Bell System

   EXAMPLES: Television, long distance calling

6. IBM introduced its first computer, the Model 701, and Remington-Rand offered the UNIVAC for commercial sale

   (NOTE: The Model 701 was what is commonly referred to as a mainframe today.)

E. 1960-1975

1. Development of the integrated chip in 1960; used in the first computer-controlled PBX

2. New options in software and hardware became available for customer selection

3. Minicomputers came of age during the 1970s

4. Modems were used even though they were slow and expensive

INFORMATION SHEET

F. 1975-85

1. Voice and data transmission improved due to technological changes
2. Microcomputers such as personal computers were introduced and became an important business tool
3. Fiber optics and other enhanced transmission processes were being developed and introduced to improve the transmission of voice, data, and video
4. The breakup of the Bell System in 1984 created a trend toward a multiple-vendor environment causing an explosion of telecommunications technologies

G. 1985 and beyond

1. Local area networks were introduced which met the needs of users wishing to share peripherals, resources, and data
2. New technologies will further lead to the interconnections for voice, data, and video systems through improvements in transmission and switching as well as services

III. Applications of telecommunications

A. Travel industry

1. Reservations for airlines, lodging, and rental cars
2. Automatic ticketing
3. Seat assignments
4. Flight information with access to arrivals, departures, cancellations, and passenger count

B. Banking

1. Automated teller machines
2. Communications between remote branches and main office
3. Home banking for the payment of bills and inquiries regarding accounts
4. Access to information for loan processing such as credit reports

INFORMATION SHEET

C. Broadcasting

1. Satellites and moveable receivers for news coverage
2. Linkage to graphics programs for headlines and artwork
3. Transmission of video to and from remote areas

D. Education

1. Registration and admission records availability
2. Interactive video and computer touch-screens for curriculum enhancement
3. Video broadcasting to multiple student locations across campus or state
4. Computer terminal access between students and instructors
5. Recruiting, fundraising, and alumni associations
6. Class scheduling and grading

E. Health care

1. Emergency communication to aid patients
2. Staff training using video or teleconferences
3. Records and information regarding patients

F. Insurance

1. Remote agents can be connected with large insurance company files via telecommunications
2. Access to program applications which will perform policy and risk analysis
3. Claims processing

G. Manufacturing

1. Quality control through part production using communications between design equipment and production equipment
2. Centralized records for billing, shipping, and order processing

INFORMATION SHEET

H. Retailing

1. Inventory control and automated reordering
2. Customer information and orientation with the use of touch screens
3. Automatic bar code reading, check and charge authorizations, and billing information
4. Home shopping

I. Cross-industry

1. Payroll
2. Order entry
3. Pricing charges
4. Inventory control
5. Electronic order exchange
6. Human resource management
7. Business accounting
8. Benefits management
9. Electronic mail

IV. Questions concerning the impact of telecommunications

A. What are the special requirements for business and industry?

B. What are the implications of a "paperless society"?

C. Can confidentiality be maintained?

D. What is the impact on individuals as technological change is forced on them in the workplace?

E. Will telecommunication eliminate the need to travel to school, work, or to handle any business situations?

ORIENTATION
UNIT I

ASSIGNMENT SHEET #1 — RESEARCH A CAREER IN TELECOMMUNICATIONS

NAME _____ SCORE _____

Directions: Research a career in telecommunications for an industry of your choice. Write a report to include the following:

1. State job title.
2. Include a job description.
3. Determine education needs.
4. List job qualifications (prior experience, skills, etc.)
5. List salary possibilities.
6. State potential career advancement opportunities.
7. Discuss changes which have taken place due to telecommunications (past, present, and future)

(NOTE: Sources of information for your report might include the *Occupational Outlook Handbook*, *Bulletin Board of Careers*, want ads, career counselors, and business magazines.)

ORIENTATION
UNIT I

ASSIGNMENT SHEET #2 — DEVELOP A SCRAPBOOK OF TELECOMMUNICATION ITEMS

NAME _____ SCORE _____

Directions: Find ten items which are the direct result of telecommunication and mount these items on paper in a scrapbook format. Place one item per page and include a brief description including the following information:

1. The name of the item and its source
2. How the item (its information) was communicated (telephone, computer, facsimile)
3. How the information was handled prior to telecommunication technology

(NOTE: Items in your scrapbook might include an airline ticket or boarding pass, utility bill, bank statement, data base address label, insurance claim, bar code from grocery item, retail price tag, and advertisement on telecommunication equipment.)

ORIENTATION
UNIT I

TEST

NAME _____ SCORE _____

1. Match the terms on the right with their correct definitions.

_____a.	A form of transmission over communication channels in a continuous waveform	1. Analog
_____b.	Insulated hollow, copper cylinder containing a signal wire conductor to transmit data	2. Coaxial cable
_____c.	Transmission of voice, data, and video through electronic means	3. Digital
_____d.	Physical components which make up a computer system	4. Fiber optics
_____e.	A form of transmission over communication channels in a series of on/off pulses	5. Hardware
_____f.	Program or programs used to direct a system	6. Modem
_____g.	Local telephone switch which serves stations within a company and accesses the public network	7. PBX
_____h.	A device used to translate signals from analog to digital or digital to analog	8. Software
_____i.	Tiny threads of glass used to transmit light pulses	9. Telecommunication
_____j.	Two insulated copper wires twisted into pairs, used to transmit signals	10. Twisted pair

TEST

2. Match dates related to the history of telecommunications on the right with their correct events.

_____a.	Transmission technological advances improved long distance transmissions through the development of copper twisted pair	1. Before 1844
_____b.	Development of the integrated chip which was used in the first computer-controlled PBX	2. 1844-1878
_____c.	Coaxial cable was introduced	3. 1878-1900
_____d.	Local area networks were introduced which met the needs of users wishing to share peripherals, resources, and data	4. 1900-1960
_____e.	IBM introduced its first computer, the Model 701, and Remington-Rand offered the UNIVAC for commercial sale	5. 1960-1975
_____f.	New options in software and hardware became available for customer selection	6. 1975-1985
_____g.	Fiber optics and other enhanced transmission processes were being developed and introduced to improve the transmission of voice, data, and video	7. 1985 and beyond
_____h.	Early telegraph started the communication process via an electrical wire path	

3. List one of the applications of telecommunications for each of the following areas:

   a. Travel industry

   _____

   _____

   b. Banking

   _____

   _____

TEST

c. Broadcasting

d. Education

e. Health care

f. Insurance

g. Manufacturing

h. Retailing

i. Cross-industry

TEST

4. List three questions concerning the impact of telecommunications.

   a. _____

   _____

   b. _____

   _____

   c. _____

   _____

(NOTE: If the following activities have not been accomplished prior to the test, ask your instructor when they should be completed.)

5. Research a career in telecommunications. (Assignment Sheet #1)

6. Develop a scrapbook of telecommunication items. (Assignment Sheet #2)

ORIENTATION
UNIT I

ANSWERS TO TEST

1.

a.	1	f.	8
b.	2	g.	7
c.	9	h.	6
d.	5	i.	4
e.	3	j.	10

2.

a.	3	e.	4
b.	5	f.	5
c.	4	g.	6
d.	7	h.	2

3. May select any one for each of the following areas:

   a. Travel industry
      1) Reservations for airlines, lodging, and rental cars
      2) Automatic ticketing
      3) Seat assignments
      4) Flight information with access to arrivals, departures, cancellations, and passenger count

   b. Banking
      1) Automated teller machines
      2) Communications between remote branches and main office
      3) Home banking for the payment of bills and inquiries regarding accounts
      4) Access to information for loan processing such as credit reports

   c. Broadcasting
      1) Satellites and moveable receivers for news coverage
      2) Linkage to graphics programs for headlines and artwork
      3) Transmission of video to and from remote areas

   d. Education
      1) Registration and admission records availability
      2) Interactive video and computer touch-screens for curriculum enhancement
      3) Video broadcasting to multiple student location across campus or state
      4) Computer terminal access between students and instructors
      5) Recruiting, fundraising, and alumni associations
      6) Class scheduling and grading

   e. Health care
      1) Emergency communication to aid patients
      2) Staff training using video or teleconferences
      3) Records and information regarding patients

ANSWERS TO TEST

f. Insurance
   1) Remote agents can be connected with large insurance company files via telecommunications
   2) Access to program applications which will perform policy and risk analysis
   3) Claims processing

g. Manufacturing
   1) Quality control through part production using communications between design equipment and production equipment
   2) Centralized records for billing, shipping, and order processing

h. Retailing
   1) Inventory control and automated reordering
   2) Customer information and orientation with the use of touch screens
   3) Automatic bar code reading, check and charge authorizations, and billing information
   4) Home shopping

i. Cross-industry
   1) Payroll
   2) Order entry
   3) Pricing changes
   4) Inventory control
   5) Electronic order exchange
   6) Human resource management
   7) Business accounting
   8) Benefits management
   9) Electronic mail

4. Any three of the following:

   a. What are the special requirements for business and industry?
   b. What are the implications of a "paperless society"?
   c. Can confidentiality be maintained?
   d. What is the impact on individuals as technological change is forced on them in the workplace?
   e. Will telecommunication eliminate the need to travel to school, work, or to handle any business situations?

5.-6. Evaluated to the satisfaction of the instructor

HARDWARE
UNIT II

UNIT OBJECTIVE

After completion of this unit, the student should be able to describe the hardware and equipment needed for the telecommunication process. Competencies will be demonstrated by completing the assignment sheets and the unit test with a minimum score of 85 percent.

SPECIFIC OBJECTIVES

After completion of this unit, the student should be able to:

1. Match terms related to hardware with their correct definitions.
2. Match types of telephone hardware with their descriptions.
3. Match major types of computers with their characteristics.
4. Complete statements concerning types of peripheral devices.
5. Describe four types of video equipment.
6. Select true statements concerning characteristics of networking systems.
7. Research a new piece of hardware. (Assignment Sheet #1)
8. Prepare a poster showing types of telecommunication hardware. (Assignment Sheet #2)

HARDWARE
UNIT II

SUGGESTED ACTIVITIES

A. Obtain additional materials and/or invite resource people to supplement/reinforce information provided in this unit of instruction.

(NOTE: This activity should be completed prior to the teaching of this unit. Suggested supplemental materials are listed in Unit I.)

B. Make transparencies from the transparency masters included with this unit.

C. Provide students with objective sheet.

D. Discuss unit and specific objectives.

E. Provide students with information and assignment sheets.

F. Discuss information and assignment sheets.

(NOTE: Use the transparencies to enhance the information as needed.)

G. Integrate the following activities throughout the teaching of this unit:

1. Take students on a field trip to view hardware being used on-the-job.
2. Have a school official discuss/explain the data processing network which is used at school.
3. Hold a class discussion for students to share the information obtained in completing Assignment Sheets #1 and #2.
4. Hold a poster contest in conjunction with Assignment Sheet #2 to provide students with an added incentive to be creative.
5. Ask hardware vendors in your area to demonstrate hardware to students if you do not have equipment.
6. Compile a list of nationally known computer companies such as Entre, Computerland, Radio Shack, Computer Craft, Businessland, etc. and have students identify those companies found locally.
7. Have students use equipment if it is available.
8. Schedule the viewing of a teleconference for students to see process in action.
9. Meet individually with students to evaluate their progress through this unit of instruction, and indicate to them possible areas for improvement.

H. Give test.

I. Evaluate test.

J. Reteach if necessary.

HARDWARE
UNIT II

INFORMATION SHEET

I. **Terms and definitions**

A. Bus configuration — Each computer plugs into a single bus cable that runs from workstation to workstation

B. Download — To receive a file from another computer

C. Fully distributed network configuration — One in which every set of nodes in the network can communicate directly with every other set of nodes through a single communication link

D. Hardware — Physical components which make up a system

E. Hierarchical configuration — Network design for multiple CPU's, in which an organization's needs are divided into multiple levels that receive different levels of computer support

F. Inpact printer — Printer that forms characters by physically striking a ribbon against paper

G. Links — The transmission channels which connect the nodes such as telephone lines and coaxial cables

H. Modem — Device used to translate signals from analog to digital and digital to analog

I. Node — Refers to the entry/exit points of a network and consists of CPU's, printers, terminals, and/or other physical devices

J. Non-impact printer — The use of heat, laser technology, or photographic techniques to print output

K. Remote networks — Cover large, geographically dispersed areas and are used mostly by large volume users due to cost

L. Ring configuration — Network design in which a number of computers are connected by a single transmission line in a circle

M. Star configuration — Network design in which all transactions must go through a central computer prior to being routed to the appropriate network computer

N. Upload — To send a file from one computer to another

INFORMATION SHEET

II. Types of telephone hardware

A. Single line set — Plain old telephone set (POTS)

B. Multi-line set — The ability to access one or more lines

C. Key systems

1. Offers flexibility and a wide variety of uses

2. Features of the system include pickup, hold, intercom, visual and audible line signals, cutoff, exclusion, and manual signaling

D. Private Branch Exchange (PBX)

1. Local telephone switch which serves stations within a company and accesses the public network

2. Typically have to dial "9" from an internal station to access a group of outside lines

E. Centrex system — Central office based leased service provided by the local exchange company

(NOTE: Some features include: incoming calls can be received without going through a central switchboard, each extension has its own seven-digit number, and calls can go through the switchboard if number is not known.

F. Hybrid key system — Key telephone system which resembles PBX in that it shares line-access characteristics of both standard key and PBX systems

G. Automatic call distributor — System designed to distribute a large volume of incoming calls to a number of agents

H. Cellular

1. Technology employing low-power radio transmission as an alternative to local loops for accessing the switched telephone network

2. Users may be stationary or mobile

3. Calls are passed under control of a central site from one cell's transmitter to an adjoining one with minimal switchover delay

I. Bridge — Connection which permits multiple stations to access one line

EXAMPLE: Telephone teleconference

INFORMATION SHEET

III. Major types of computers

(NOTE: Some characteristics/functions of computers may apply to more than one type.)

A. Microcomputers

1. Main computing component is located on one integrated circuit or chip
2. Smallest of all computers
3. Usually the least expensive
4. Also known as a personal computer
5. May allow user to download information from mainframe or minicomputer and then upload the information back to the other computer

B. Minicomputer

1. Also called medium-sized computers
2. Can perform many of the tasks on a reduced scale that mainframes can
3. Less expensive, slower and smaller than a mainframe but larger, faster, and more expensive than a microcomputer

C. Mainframe computer

1. Able to support multiple operating systems
2. Peripherals will run at higher speeds
3. Able to handle the processing needs of large organizations
4. Requires special power and environmental control requirements
5. Usually housed in a special room

D. Super computer

1. Most expensive; largest and fastest of the major types of computers
2. Used for scientific applications

INFORMATION SHEET

IV. **Types of peripheral devices** (Transparency 1)

A. Modem (Transparency 2)

1. **MO**dulator/**DEM**odulator
2. Transforms the bit patterns (digital signal) from the terminal into an analog signal that can be sent along standard communication lines
3. Receives the analog signal and converts it back to the original digital signal
4. Acoustic connect is designed to use a regular telephone receiver with two cups in which the earpiece and mouthpiece are placed
5. Direct connect permits modem to be connected directly into the telephone jack

B. Monitor

1. Television-like device for viewing computer information
2. Monochrome or single color displays may be black and white, green, amber, or almost any color, and most monochrome video displays are high resolution displays
3. Also called video display terminal or screen

(NOTE: Light pens or touch screens can also serve as input devices with a monitor.)

C. Keyboard

(NOTE: When the monitor and keyboard are manufactured as one unit, this is called a terminal.)

1. Used to input data into the system
2. May have standard keys, numeric keys, control keys, alternate keys, function keys, reset key, and an escape key

D. Printer

1. Computer output device that produces printed copy
2. Must be compatible with the microcomputer
3. Quality of print and speed of printer should be considered when selecting the type of printer
4. There are two types of printers — impact and non-impact

EXAMPLES: Impact — Dot-matrix, daisy-wheel, chain
Non-Impact — Inkjet, laser

E. Other peripheral devices related to telecommunications — Bar code reader, mouse, page scanner, light pens, touch screens

INFORMATION SHEET

V. **Types of video equipment** (Transparency 3)

A. Monitor

1. Does the job of either a TV monitor or a TV receiver
2. Accepts either radio frequency from which it derives picture and sound, or it accepts video and audio separately and displays them
3. May look exactly like a home TV set except for one switch and socket on the side or back
4. Switch changes the TV from a monitor to a receiver

B. Camera

1. Consists of a lens, a box of electronics with built-in automatic controls to give you a good picture, an electric cord for power, and a socket called VIDEO OUT
2. Needs a cable to connect the VIDEO OUT to the VIDEO IN of either a monitor or a videotape recorder

C. Videocassette recorder (VCR)

(NOTE: This may also be referred to as a videotape recorder [VTR].)

1. Can record a videocassette or play it back
2. Format can vary
   a. Cassette, cartridge, reel-to-reel
   b. VHS, BETA, 8mm, Umatic
   c. Size of tape (½", ¾", and 8mm)

D. Microphone

1. Used to transmit and record audio sounds
2. Can be a separate unit or part of the camera or recorder
3. Can be used to project sound in a large group for a conference

VI. **Characteristics of networking systems** (Transparency 4)

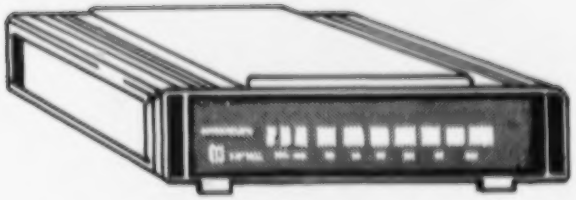
A. Networking is the linking together of CPU's and terminals via a communication system which allows users at different locations to share files, devices, and programs.

B. Networks may be remote or local.

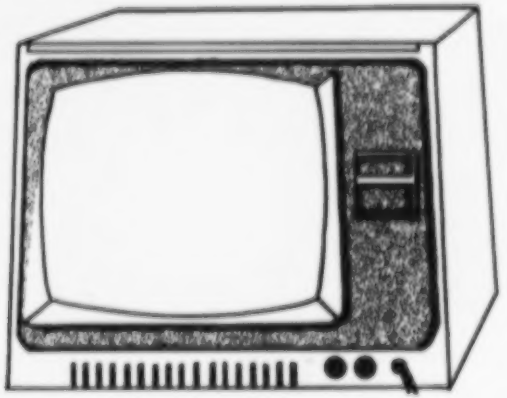
C. All networks are comprised of two basic components: nodes and links.

D. A network's architecture can be a star, ring, hierarchical, bus, or fully distributed configuration.

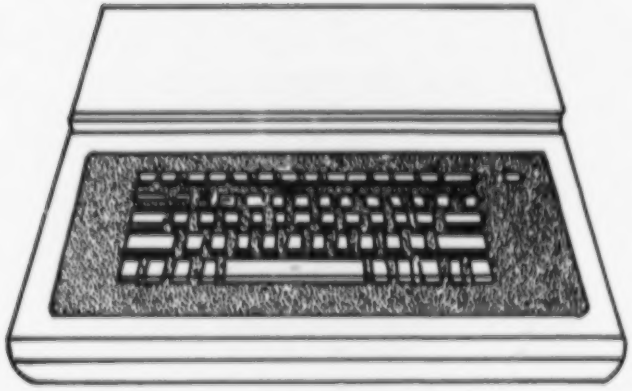
Types of Peripheral Devices



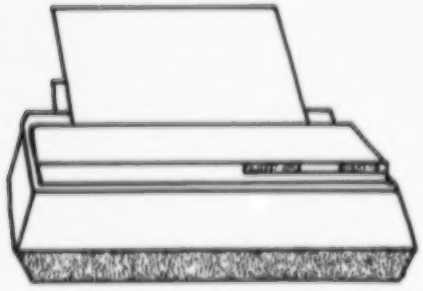
Modem



Monitor



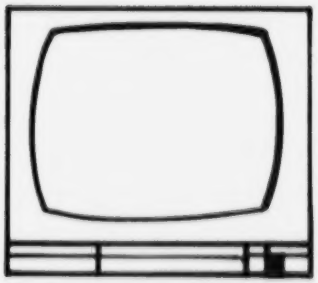
Keyboard



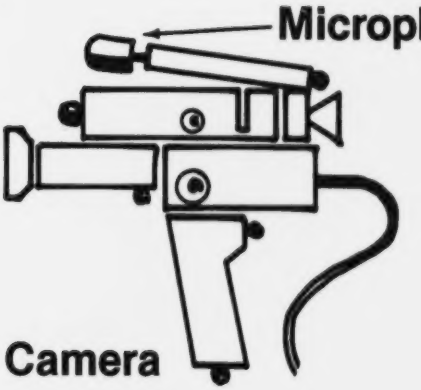
Printer

How a Modem Works

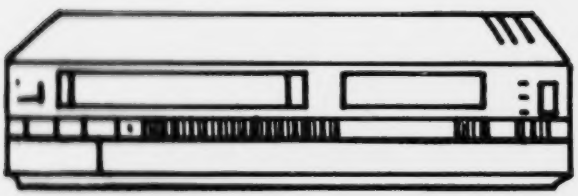
Video Equipment



Monitor

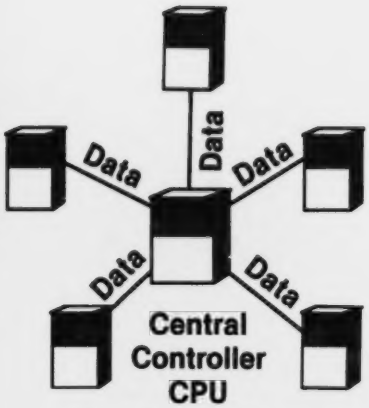


Camera

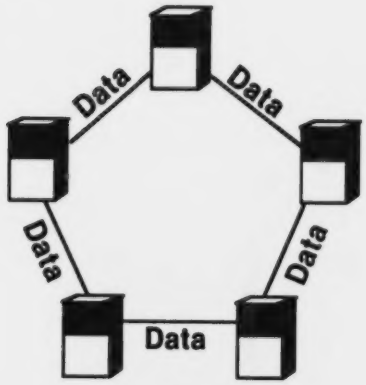


Videocassette Recorder (VCR)

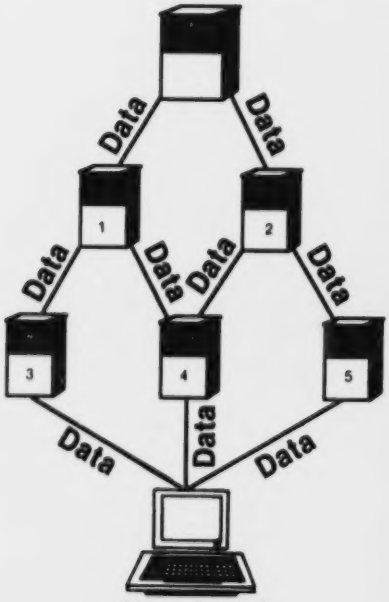
Networking Systems



Star Configuration



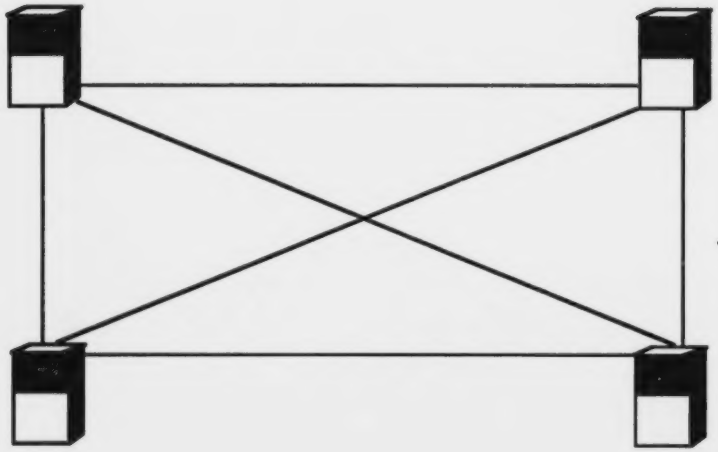
Ring Configuration



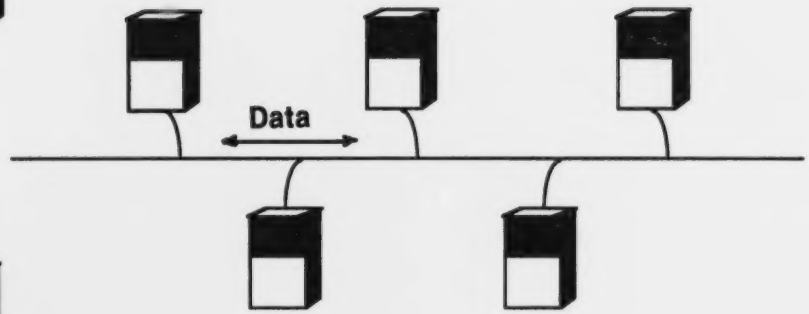
User Level

Hierarchical Configuration

Networking Systems
(Continued)



Fully Distributed Configuration



Bus Configuration

HARDWARE
UNIT II

ASSIGNMENT SHEET #1 — RESEARCH A NEW PIECE OF HARDWARE

NAME _____ SCORE _____

Directions: Research a new piece of hardware using computer magazines and brochures from vendors. Then, write a two-page report.

Some specific items which you will need to include are the following:

A. Type of hardware

B. Application(s)

C. Businesses where hardware may be found

D. Training time needed to use hardware

E. Features advertised

F. How new hardware compares to previous models

HARDWARE
UNIT II

ASSIGNMENT SHEET #2 — PREPARE A POSTER SHOWING TYPES OF TELECOMMUNICATIONS HARDWARE

NAME _____ SCORE _____

Directions: Using computer or business magazines and vendor brochures, prepare a poster showing at least eight types of telecommunications hardware. Include a description of each type and list the applications.

(NOTE: Colored board may be used and poster should be large enough to present picture and information in a pleasing manner. Be creative.)

EXAMPLES: Telephone hardware, computer systems, peripheral devices, video equipment

HARDWARE
UNIT II

TEST

NAME _____ SCORE _____

1. Match the terms on the right with their correct definitions.

_____a.	Network design in which a number of computers are connected by a single transmission line in a circle	1. Bus configuration
_____b.	The transmission channels which connect the nodes such as telephone lines and coaxial cables	2. Download
_____c.	One in which every set of nodes in the network can communicate directly with every other set of nodes through a single communication link	3. Fully distributed network configuration
_____d.	Physical components which make up a system	4. Hardware
_____e.	Each computer plugs into a single bus cable that runs from workstation to workstation	5. Hierarchical configuration
_____f.	Refers to the entry/exit points of a network and consists of CPUs, printers, terminals, and/or other physical devices	6. Impact printer
_____g.	To send a file from one computer to another	7. Links
_____h.	Network design for multiple CPU's, in which an organization's needs are divided into multiple levels that receive different levels of computer support	8. Modem
_____i.	The use of heat, laser technology, or photographic techniques to print output	9. Node
_____j.	Cover large, geographically dispersed areas and are used mostly by large volume users due to cost	10. Non-impact printer
_____k.	Device used to translate signals from analog to digital and digital to analog	11. Remote networks
		12. Ring configuration
		13. Star configuration
		14. Upload

TEST

_____l. Network design in which all transactions must go through a central computer prior to being routed to the appropriate network computer

_____m. To receive a file from another computer

_____n. Printer that forms characters by physically striking a ribbon against paper

2. Match types of telephone hardware on the right with their descriptions.

_____a. System designed to distribute a large volume of incoming calls to a number of agents

_____b. Leased service provided by the local exchange company

_____c. Connection which permits multiple stations to access one line

_____d. Calls are passed under control of a central site from one cell's transmitter to an adjoining one with minimal switchover delay

_____e. Plain old telephone set

_____f. Features of the system include pickup, hold, intercom, visual and audible line signals, cutoff, exclusion, and manual signaling

_____g. Local telephone switch which serves stations within a company and accesses the pubic network

_____h. The ability to access one or more lines

_____i. Key telephone system which resembles PBX

1. Single line set
2. Multi-line set
3. Key systems
4. Private branch exchange (PBX)
5. Centrex system
6. Hybrid key system
7. Automatic call distributor
8. Cellular
9. Bridge

TEST

3. Match the major types of computers on the right with their characteristics.

   (NOTE: Answers may be used more than once.)

   _____a. Supports a large number of individual terminals

   _____b. Most expensive; largest and fastest of the major types of computers

   _____c. Requires special power and environmental control requirements

   _____d. Also called medium-sized computers

   _____e. Smallest of all computers

   _____f. Able to support multiple operating systems

   _____g. Usually the least expensive

   _____h. Used for scientific applications

   1. Microcomputer
   2. Minicomputer
   3. Mainframe computer
   4. Super computer

4. Complete the following statements concerning types of peripheral devices by inserting the word(s) that best complete(s) each statement.

   a. The modem receives the _____ signal and converts it back to the original _____ signal.

   b. The monitor is a television-like device for viewing computer information; it is also called a _____ _____ _____ or screen.

   c. The keyboard is used to _____ _____ into the system.

   d. The _____ of print and _____ of printer should be considered when selecting type of printer.

   e. Other peripheral devices related to telecommunications are bar code reader, _____, page scanner, light pens, and touch screens.

TEST

5. Describe the four types of video equipment listed below.

   a. Monitor — _____

   _____

   b. Camera — _____

   _____

   c. Videocassette recorder — _____

   _____

   d. Microphone — _____

   _____

6. Select true statements concerning the characteristics of networking systems by placing an "X" in the blanks preceding the true statements.

   _____a. Networking is the linking together of CPU's and terminals via a communication system which allows users at different locations to share files, devices, and programs.

   _____b. Networks may be remote or local.

   _____c. All networks are comprised of two basic components: nodes and links.

   _____d. A network's architecture can be a star, ring, hierarchical, bus, or fully distributed configuration.

(NOTE: If the following activities have not been accomplished prior to the test, ask your instructor when they should be completed.)

7. Research a new piece of hardware. (Assignment Sheet #1)

8. Prepare a poster showing types of telecommunication hardware. (Assignment Sheet #2)

HARDWARE
UNIT II

ANSWERS TO TEST

1.

a.	12	f.	9	k.	8
b.	7	g.	14	l.	13
c.	3	h.	5	m.	2
d.	4	i.	10	n.	6
e.	1	j.	11		

2.

a.	7	f.	3
b.	5	g.	4
c.	9	h.	2
d.	8	i.	6
e.	1		

3.

a.	3	d.	2	g.	1
b.	4	e.	1	h.	4
c.	3	f.	3		

4.
a. Analog, digital
b. Video display terminal
c. Input data
d. Quality, speed
e. Mouse

5. Answer should include a basic description of the following:

a. Monitor
   1) Does the job of either a TV monitor or a TV receiver
   2) Accepts either radio frequency from which it derives picture and sound, or it accepts video and audio separately and displays them
   3) May look exactly like a home TV set except for one switch and socket on the side or back
   4) Switch changes the TV from a monitor to a receiver

b. Camera
   1) Consists of a lens, a box of electronics with built-in automatic controls to give you a good picture, an electric cord for power, and a socket called VIDEO OUT
   2) Needs a cable to connect the VIDEO OUT to the VIDEO IN of either a monitor or a videotape recorder

ANSWERS TO TEST

c. Videocassette recorder (VCR)
   1) Can record a videocassette or play it back
   2) Format can vary
      a) Cassette, cartridge, reel-to-reel
      b) VHS, BETA, 8mm, Umatic
      c) Size of tape (1/2", 3/4", and 8mm)

d. Microphone
   1) Used to transmit and record audio sounds
   2) Can be a separate unit or part of the camera or recorder
   3) Can be used to project sound in a large group for a conference

6. All are true

7.-8. Evaluated to the satisfaction of the instructor

SOFTWARE
UNIT III

UNIT OBJECTIVE

After completion of this unit, the student should be able to distinguish among the types of software currently being used in business and industry. Competencies will be demonstrated by completing the assignment sheets and the unit test with a minimum score of 85 percent.

SPECIFIC OBJECTIVES

After completion of this unit, the student should be able to:

1. Match terms related to software with their correct definitions.
2. Match types of computer operating systems software with their characteristics.
3. Select characteristics of a telephone operating system.
4. Match types of business software with their examples.
5. List examples for each type of audiovisual software.
6. Research software currently being used in business and industry. (Assignment Sheet #1)
7. Match types of business software with their applications. (Assignment Sheet #2)
8. Determine the types of videotapes available in video stores. (Assignment Sheet #3)

SOFTWARE
UNIT III

SUGGESTED ACTIVITIES

A. Obtain additional materials and/or invite resource people to supplement/reinforce information provided in this unit of instruction.

(NOTE: This activity should be completed prior to the teaching of this unit. Suggested supplemental materials are listed in Unit I.)

B. Provide students with objective sheet.

C. Discuss unit and specific objectives.

D. Provide students with information and assignment sheets.

E. Discuss information and assignment sheets.

F. Integrate the following activities throughout the teaching of this unit:

1. Write to software vendors to request demonstration copies of programs.
2. Demonstrate software to students if equipment and software are available.
3. Have students learn software packages if equipment and software are available. This knowledge will be useful for possible projects in other units.
4. Take students on a field trip to view hardware and software being used in local businesses.
5. Show examples of audiovisual software to students.
6. Meet individually with students to evaluate their progress through this unit of instruction, and indicate to them possible areas for improvement.

G. Give test.

H. Evaluate test.

I. Reteach if necessary.

SOFTWARE
UNIT III

INFORMATION SHEET

I. **Terms and definitions**

A. Communication software — Programs that assist in the transfer of information across communication channels by convincing the computer to act as if the microcomputer was a terminal and a part of the communication system

B. Computer operating systems — Programs that control the operation of the computer system

C. Data base management systems — Programs that serve as the interface between the data base and the programmer, operating system, and users

D. Integrated software — Two or more application programs which work together to allow easy movement of data between the applications

E. Local-area networks — Operate within a well-defined and generally self-enclosed area

F. Software — Program or programs used to direct a system

G. Spreadsheet — Programs that create a table of data and allow any piece(s) of data to be defined mathematically in terms of any other data within the table

H. Word processor — Programs that perform text-editing functions

II. **Types of computer operating systems software and their characteristics**

A. UNIX

1. Developed by Bell Laboratories

2. One of the most powerful operating systems on the market and allows performance of more than one task at a time by multiple users

3. Can be used on all types of computer systems

B. XENIX

1. Is called the UNIX work-alike operating system

2. Developed by Microsoft

3. Can work on more than one program at a time

INFORMATION SHEET

C. MS-DOS

1. Developed by Microsoft
2. Used on many IBM compatible microcomputers

D. PC-DOS

1. Developed by International Business Machines Corporation (IBM)
2. Used on IBM personal computers

E. Apple DOS

1. Developed by Apple Computer, Inc.
2. Used on Apple microcomputers

F. TRS-DOS

1. Developed by Radio Shack Division of Tandy Corporation
2. Used on Radio Shack microcomputers

G. Office System II — Developed by IBM to replace PC-DOS

III. Characteristics of a telephone operating system

A. Will allow the user to perform a variety of operations

B. Varies with the hardware depending upon the vendor and equipment choice

C. Is internal within an organization

D. May include the following features:

(NOTE: There are more than 100 features available.)

1. Speed dialing
2. Automatic redial
3. Call waiting
4. Call queing
5. Call forwarding
6. Conference calling
7. Call pickup
8. Message center

INFORMATION SHEET

IV. Types of business software and their examples

A. Integrated software

1. Apple Works
2. Symphony
3. Enable
4. Write Power II
5. Smart System
6. DeskMate

B. Data base management system

1. dBASE III Plus
2. Double Helix 1.0
3. Omnis 3 plus 3.24
4. Paradox 1.1
5. Powerbase 2.3
6. R:BASE System W
7. Reflex for the Macintosh 1.01
8. Universal base SIX 6.6

C. Spreadsheet

1. Excel
2. Lotus 1-2-3
3. SuperCalc 4
4. Trapeze

INFORMATION SHEET

D. Word processing/desktop publishing

1. Displaywrite 4
2. Multimate
3. Pagemaker
4. Ventura Publisher
5. Word Perfect
6. WordStar 2000
7. WriteNow 1.0
8. MindWrite 1.0
9. Microsoft Word

E. Communication

1. ASCII Pro 1.3
2. Blast-II 8.0
3. Crosstalk XVI 3.61
4. Flash 1.12
5. HyperACCESS 3.20
6. MicroPhone 1.0
7. Microsoft Access 1.01
8. ProComm 2.4.2
9. Red Ryder 9.4
10. Relay Gold 2.0
11. Smartcom II 2.1
12. Telescope 1.0
13. Kermit
14. Info Access
15. Pro Comm A

INFORMATION SHEET

V. Types of audiovisual software

A. Audio tapes

1. Reel-to-reel
2. Cassette

B. Video tapes

(NOTE: Size can vary depending upon equipment.)

1. Beta
2. VHS
3. 8mm
4. Umatic

SOFTWARE
UNIT III

ASSIGNMENT SHEET #1 — RESEARCH SOFTWARE CURRENTLY BEING USED IN BUSINESS AND INDUSTRY

NAME _____ SCORE _____

Directions: Using magazines and vendor brochures, research the types of software currently being used in business and industry in one of the following areas:

Data base management

Spreadsheet

Word processing/desktop publishing

Communications

Integrated software

Write a short report on the software package you have chosen. The following questions should be answered.

A. What are the features of the software package?

B. How much does it cost?

C. What computer systems will it run on?

D. What are the business applications?

E. Who developed the software?

F. What are the advantages of the software?

G. What are the disadvantages of the software?

H. What is the availability of the software?

SOFTWARE
UNIT III

ASSIGNMENT SHEET #2 — MATCH TYPES OF BUSINESS SOFTWARE WITH THEIR APPLICATIONS

NAME _____ SCORE _____

Directions: Match the types of software listed on the right with their applications. Answers may be used more than once.

_____a.	Typing a letter	1.	Integrated software
_____b.	Combining data files into a report	2.	Data base management system
_____c.	Organizing sales figures	3.	Spreadsheet
_____d.	Text editing	4.	Word processing/desktop publishing
_____e.	File handler	5.	Communication
_____f.	Financial calculations		
_____g.	Sharing data between computers		
_____h.	Varies type styles for publishing		
_____i.	Financial reports and graphs		
_____j.	Two or more packages for processing data		

SOFTWARE
UNIT III

ASSIGNMENT SHEET #3 — DETERMINE THE TYPES OF VIDEOTAPES AVAILABLE IN VIDEO STORES

NAME _____ SCORE _____

Directions: Visit your local video stores to determine the various types of videotapes which are available. List two examples in each category.

A. Educational

1. _____
2. _____

B. Business

1. _____
2. _____

C. Entertainment

1. _____
2. _____

D. Health and Fitness

1. _____
2. _____

E. Personal Improvement

1. _____
2. _____

SOFTWARE
UNIT III

ANSWERS TO ASSIGNMENT SHEETS

Assignment Sheet #1 — Evaluated to the satisfaction of the instructor

Assignment Sheet #2

a.	4	f.	3
b.	1	g.	5
c.	3	h.	4
d.	4	i.	3
e.	2	j.	1

Assignment Sheet #3 — Evaluated to the satisfaction of the instructor

SOFTWARE
UNIT III

TEST

NAME _____ SCORE _____

1. Match the terms on the right with their correct definitions.

_____a.	Operate within a well-defined and generally self-enclosed area	1. Communication software
_____b.	Programs that perform text-editing functions	2. Computer operating systems
_____c.	Programs that assist in the transfer of information across communication channels by convincing the computer to act as if the microcomputer was a terminal and a part of the communication system	3. Data base management systems
		4. Integrated software
		5. Local-area networks
_____d.	Programs that control the operation of the computer system	6. Software
_____e.	Programs that serve as the interface between the data base and the programmer, operating system, and users	7. Spreadsheet
		8. Word processor
_____f.	Program or programs used to direct a system	
_____g.	Programs that create a table of data and allow any piece(s) of data to be defined mathematically in terms of any other data within the table	
_____h.	Two or more application programs which work together to allow easy movement of data between the applications	

TEST

2. Match the types of computer operating systems on the right with their correct characteristics.

_____a.	Used on the Radio Shack microcomputer	1. UNIX
_____b.	Developed by IBM to replace PC-DOS	2. XENIX
_____c.	Used on IBM personal computers	3. MS-DOS
_____d.	Developed by Apple Computer, Inc.	4. PC-DOS
_____e.	Developed by Bell Laboratories	5. Apple DOS
_____f.	Is called the UNIX work-alike operating system	6. TRS-DOS
		7. Office System II
_____g.	Developed by Microsoft	

3. Select characteristics of a telephone operating system by placing an "X" in the blanks preceding the correct characteristics.

_____a. Limits the user to only two or three operations

_____b. Is internal within an organization

_____c. Speed dialing, automatic redial, and conference calling are a few of the features

_____d. Varies with the hardware depending upon the vendor and equipment choice

TEST

4. Match types of business software on the right with their correct examples.

_____a.	1) Multimate 2) Pagemaker 3) Word Perfect	1. Integrated software 2. Data base management system 3. Spreadsheet 4. Word processing/ desktop publishing 5. Communication
_____b.	1) Crosstalk XVI 3.61 2) Flash 1.12 3) Pro Comm 2.4.2	
_____c.	1) Excel 2) Lotus 1-2-3 3) Trapeze	
_____d.	1) Paradox 1.1 2) Powerbase 2.3 3) Omnis 3 plus 3.24	
_____e.	1) Smart System 2) Symphony 3) Enable	

5. List two examples for each type of audiovisual software.

   a. Audiotapes

      1) _____

      2) _____

   b. Video tapes

      1) _____

      2) _____

(NOTE: If the following activities have not been accomplished prior to the test, ask your instructor when they should be completed.)

6. Research software currently being used in business and industry. (Assignment Sheet #1)

7. Match types of business software with their applications. (Assignment Sheet #2)

8. Determine the types of videotapes available in video stores. (Assignment Sheet #3)

SOFTWARE
UNIT III

ANSWERS TO TEST

1. a. 5
   b. 8
   c. 1
   d. 2
   e. 3
   f. 6
   g. 7
   h. 4

2. a. 6
   b. 7
   c. 4
   d. 5
   e. 3
   f. 2
   g. 2 or 3

3. b, c, d

4. a. 4
   b. 5
   c. 3
   d. 2
   e. 1

5. a. 1) Reel-to-reel
      2) Cassette

   b. Any two of the following:
      1) Beta
      2) VHS
      3) 8mm
      4) Umatic

6.-8. Evaluated to the satisfaction of the instructor

METHODS OF TRANSMISSION
UNIT IV

UNIT OBJECTIVE

After completion of this unit, the student should be able to describe the methods of transmission including the speed, mode, grades, and transportation systems used in the telecommunication process. Competencies will be demonstrated by completing the assignment sheets and the unit test with a minimum score of 85 percent.

SPECIFIC OBJECTIVES

After completion of this unit, the student should be able to:

1. Match terms related to methods of transmission with their correct definitions.
2. Distinguish between analog and digital transmission.
3. Define the three modes of transmission.
4. Match the speeds of transmission with their correct uses.
5. Match transportation systems with their correct descriptions.
6. Survey businesses in your community to determine their use of telecommunications. (Assignment Sheet #1)
7. Design a networking system to transmit data within your school. (Assignment Sheet #2)

METHODS OF TRANSMISSION
UNIT IV

SUGGESTED ACTIVITIES

A. Obtain additional materials and/or invite resource people to supplement/reinforce information provided in this unit of instruction.

(NOTE: This activity should be completed prior to the teaching of this unit. Suggested supplemental materials are listed in Unit I.)

B. Make transparencies from the transparency masters included with this unit.

C. Provide students with objective sheet.

D. Discuss unit and specific objectives.

E. Provide students with information and assignment sheets.

F. Discuss information and assignment sheets.

(NOTE: Use the transparencies to enhance the information as needed.)

G. Integrate the following activities throughout the teaching of this unit:

1. Invite a technical expert to your class to discuss methods of tranmission with students.

2. Demonstrate methods of transmission if equipment and software are available.

3. Locate and show films which discuss methods of transmission. Your local telephone company may be an excellent source.

4. Have students collect examples of components used to make telecommunications work.

5. Explain the input/output process and how components work.

6. Ask a member of a computer user group to speak to class.

7. Compile a list of businesses in your community which use hardware and software to communicate. Explain how the equipment is used.

   EXAMPLES: Telephone company, bank, cooperative, utility company, insurance, library, government offices

8. Set up an oscilloscope to a telephone and have students view modulation/demodulation waveforms.

SUGGESTED ACTIVITIES

9. Have students make a collage of transportation modes and systems to depict methods of transmission.

10. Have students share their information collected in Assignment Sheet #1 with the rest of the class.

11. Have students establish a true communications link between two devices. Refer to Handout #1.

12. Meet individually with students to evaluate their progress through this unit of instruction, and indicate to them possible areas for improvement.

H. Give test.

I. Evaluate test.

J. Reteach if necessary.

METHODS OF TRANSMISSION
UNIT IV

INFORMATION SHEET

I. **Terms and definitions**

A. Bandwidth (also known as grade) — The range or width of the frequencies available for transmission on a given channel

B. Baud — Unit used to measure transmission speeds

C. Central office — Centralized switching site which allows communications between two or more locations

D. Channel — Path for transmission of signals between two or more points

E. Circuit — The connection which enables the customer to access common user and/or private line telecommunication services

F. Transponder — Receiver/transmitter combination that retransmits a received signal greatly amplified

EXAMPLE: Satellites usually contain several transponders

II. **Analog and digital transmission** (Transparency #1)

A. Analog — A form of transmission over communication channels in a continuous waveform

B. Digital — A form of transmission over communication channels in a series of on/off pulses

III. **Modes of transmission**

A. Simplex transmission — Transmits data in only one direction; can either send or receive data but it cannot do both

B. Half-duplex transmission — Transmits data in two directions but only one way at a time

C. Full-duplex transmission — Transmits data in both directions simultaneously

(NOTE: This is a very versatile type of transmission.)

INFORMATION SHEET

IV. Speeds of transmission

(NOTE: Baud rate is the speed of the transmission. Synchronization requires computers on each end of a data transmission to work together so data that are sent can be properly interpreted.)

A. 110 bits per second — About 10 character per second and is used in teletypes

B. 300 bits per second — About 27 characters per second and is used by many information retrieval services

C. 1200 bits per second — Can send data at approximately four times the rate of a modem with a baud rate of 300

D. 2400 bits per second — Newest kind of modem can transport at this speed

E. 5600 bits per second — USA standard which is being changed to the 6400 standard of the Integrated Service Digital Network (ISDN)

F. 9600 and 19200 bits per second — About 870 and 1750 characters per second and are used for high volume, computer-to-computer communications which do not require human intervention

G. 1.5 megabits per second — Used for high volume applications on private lines to reconfigure data networks; used to offload computers and to derive voice, data, and image channels through multiplexers

EXAMPLE: Skynet 1.5 Satellite Service

V. Transportation systems (Transparency 2)

A. Telephone circuits/channels

1. Telephone lines are transmission facilities within a telephone system; part of a local loop that connects a subscriber to the central office

2. Packet switching is a data transmission technique in which data messages are divided into blocks or packets of standard length, each of which has address and control information coded into it

B. Twisted pair

1. Two insulated copper wires twisted into pairs

2. Can be used across town or across country

3. Primary path between phones, terminals, and modems to telephone company's central office

INFORMATION SHEET

C. Microwave (Transparency 3)

1. High-frequency transmission signals and equipment that can transmit signals
2. Usually include line-of-sight or omni-directional, open-air transmission
3. Easily disturbed
4. Towers or tall buildings with horns or dishes are repeater stations which pick up the signal, amplify it, and pass it to the next tower

D. Fiber optics — A data transmission concept using cables made of tiny threads of glass to transmit light pulses

E. Coaxial cable

1. Also called COAX
2. Insulated hollow copper cylinder containing a signal wire conductor to transmit data

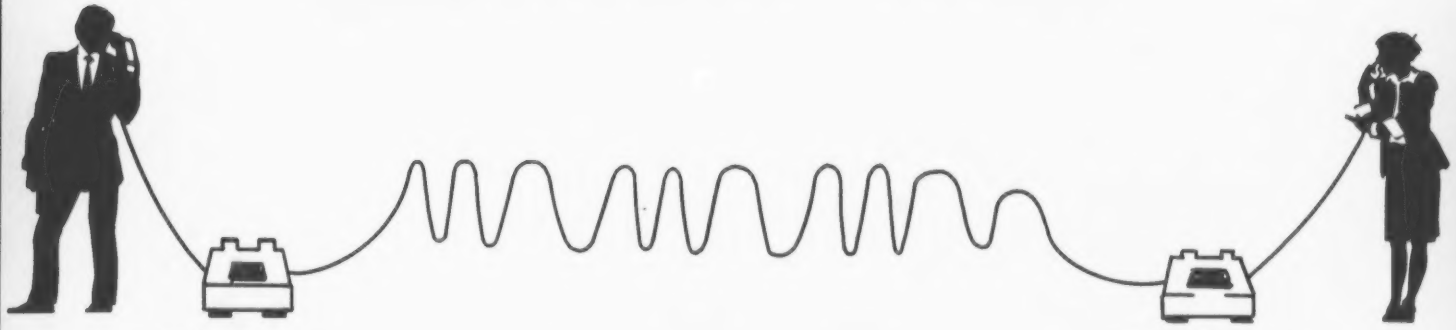
F. Digital carrier

1. A means to send signals from any sources over a signal physical channel
2. Can carry voice or data

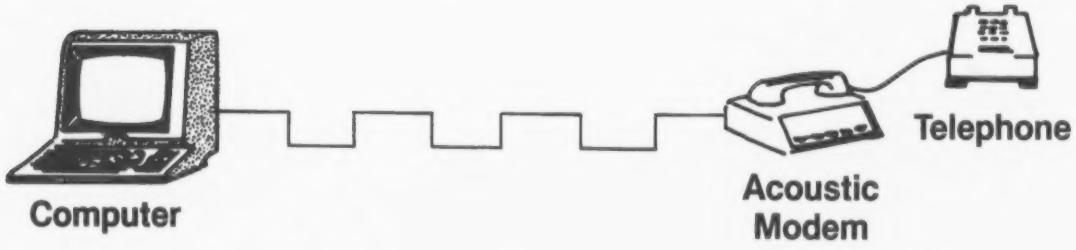
G. Satellite (Transparency 4)

1. Transponders on satellites act as relay stations for uplink and downlink earth stations
2. Uplinks transmit narrow microwave beams to the satellite
3. Downlinks receive amplified signals from satellite transponders
4. Satellite's coverage area is called footprint
5. Works best in one-way transmission; for two-way there is a noticeable delay in response

Analog and Digital Transmission



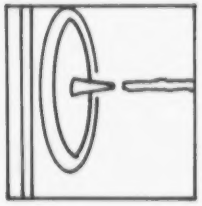
Analog Data Transmission



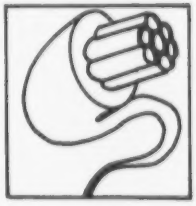
Digital Data Transmission

Transportation Systems

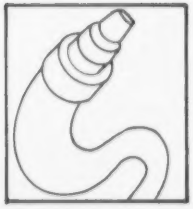
Twisted Pair



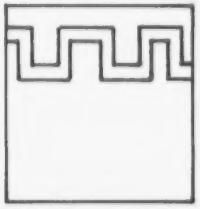
Microwave



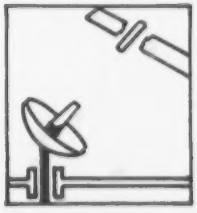
Fiber Optics



Coaxial Cable

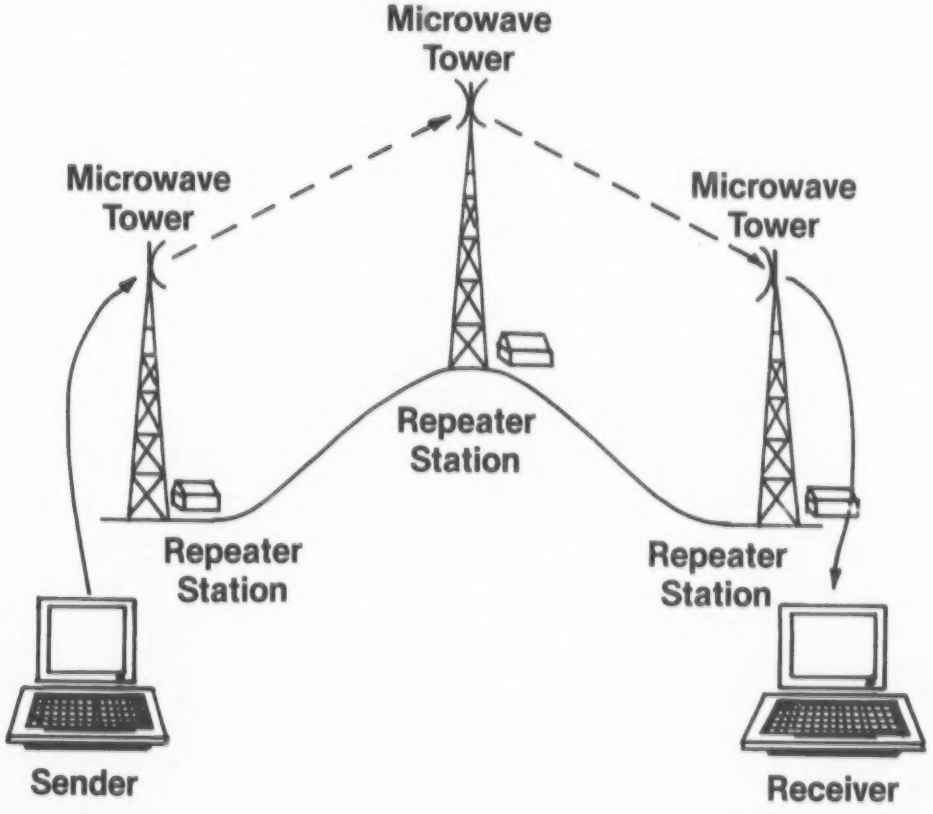


Digital Carrier



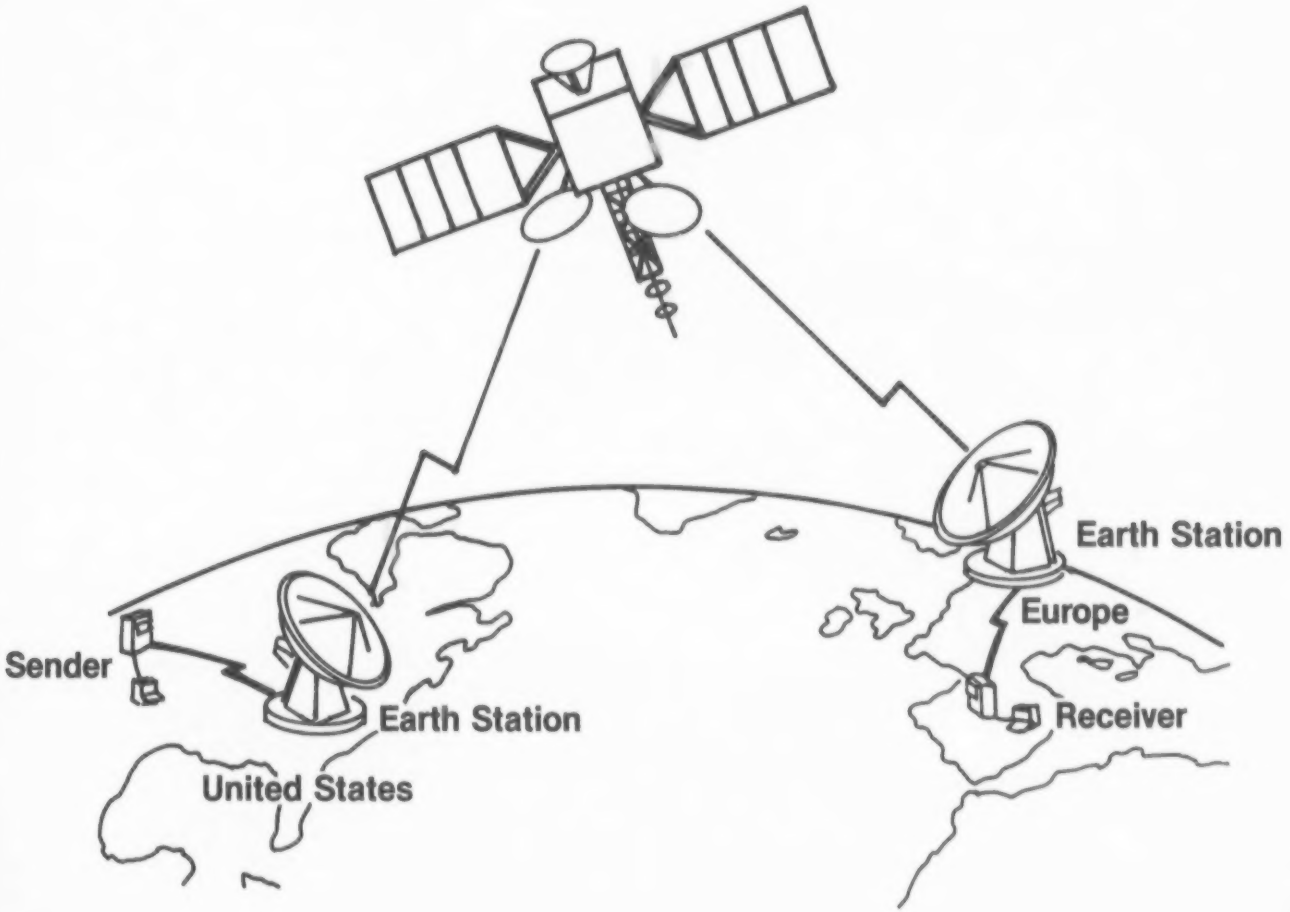
Satellite Link

Microwave Network



TM 3

Satellite Communication System



METHODS OF TRANSMISSION
UNIT IV

HANDOUT #1 — CONNECT 2 PCs TOGETHER VIA THE SERIAL PORT ON PC (ELIMINATING MODEMS) TO ESTABLISH A TRUE COMMUNICATIONS LINK BETWEEN TWO DEVICES

PURPOSE:

To demonstrate an actual telecommunications (or data communications) session within the confines of the classroom, utilizing both hardware and software. Attempts should be made to experiment with different transmission speeds, dissimilar pieces of communications software and associated communications parameters such as parity, data bits and stop bits (the instructor should see that documentation is provided for the various software packages). This experimentation can be done once a path has been established between the two PCs.

EQUIPMENT NEEDED:

2 - IBM or compatible PCs with serial port

1 or more communications software package such as those found in Unit III, Objective IV.

1 'NULL MODEM CABLE'* to connect the 2 PCs together via the serial port in the back of the PC.

* NULL MODEM CABLE — A cable (RS232) that incorporates the proper cross-over connections that allow you to connect 2 PCs together via the serial port.

PROCEDURE:

1. Setup the 2 PCs approximately 10ft. apart or the length of the NULL MODEM CABLE you have acquired, as long as they are within 50 ft.
2. Connect the 2 PCs with the NULL MODEM CABLE to the serial port on the back of both PCs (male connector on the PC).
3. Boot your PC with DOS and load your communications software on both PCs.
4. Set the communications parameters on both PCs so they match and establish a session.
5. At this point you should be able to communicate between PCs.
   a) Send messages
   b) Transfer files
6. Experiment with different software and options as stated above.

   (NOTE: Check with your instructor to determine the appropriate experiments to be conducted on other existing software.)

METHODS OF TRANSMISSION
UNIT IV

ASSIGNMENT SHEET #1 — SURVEY A BUSINESS IN YOUR COMMUNITY TO DETERMINE METHODS OF TRANSMISSION

NAME _____ SCORE _____

Directions: Survey a business in your community to determine their use of telecommunications. Write a short report. Be very specific. Use examples and information from previous units to develop the questions below as well as those you might add.

Possible questions:

1. What applications do they use it for?
2. What types of hardware do they have?
3. What software programs are they using?
4. What modes of transmission are available to different businesses?
5. What baud rate is being used?

METHODS OF TRANSMISSION
UNIT IV

ASSIGNMENT SHEET #2 — DESIGN A NETWORKING SYSTEM TO TRANSMIT DATA WITHIN YOUR SCHOOL

NAME _____ SCORE _____

Directions: Design a networking system which will transfer data from the school secretary to the administrator's office.

(NOTE: It is important to use the previous four units to complete this assignment sheet.)

1. Define applications and records which could be transmitted.
2. List hardware which is needed. Be specific as to what vendor and products would be used.
3. List software programs which will be used to transfer data.
4. Discuss methods of transmission.

METHODS OF TRANSMISSION
UNIT IV

TEST

NAME _____ SCORE _____

1. Match the terms on the right with their correct definitions.

_____a.	Path for transmission of signals between two or more points	1. Bandwidth
_____b.	Centralized switching site which allows communications between two or more locations	2. Baud 3. Central office
_____c.	The range or width of the frequencies available for transmission on a given channel	4. Channel 5. Circuit
_____d.	Unit used to measure transmission speeds	6. Transponder
_____e.	Receiver/transmitter combination that retransmits a received signal greatly amplified	
_____f.	The connection which enables the customer to access common user and/or private line telecommunication services	

2. Distinguish between analog and digital transmission by placing an "A" for analog in the blank preceding the correct description.

_____a. A form of transmission over communication channels in a series of on/off pulses

_____b. A form of transmission over communication channels in a continuous waveform

3. Define the three modes of transmission.

a. Simplex transmission — _____

_____

_____

b. Half-duplex transmission — _____

_____

_____

c. Full-duplex transmission — _____

_____

_____

TEST

4. Match the speeds of transmission on the right with their correct uses.

_____a.	Newest kind of modem can transport at this speed	1. 110
_____b.	About 27 characters per second and is used by many information retrieval services	2. 300
_____c.	About 870 and 1750 characters per second and are used for high volume, computer-to-computer communications which do not require human intervention	3. 1200
_____d.	About 10 characters per second and is used in teletypes	4. 2400
_____e.	Can send data at approximately four times the rate of a modem with a baud rate of 300	5. 5600
_____f.	USA standard which is being changed to the 6400 standard of the Integrated Service Digital Network (ISDN)	6. 9600 to 19200
_____g.	Used for high volume applications on private lines to reconfigure data networks; used to offload computers and to derive voice, data, and image channels through multiplexes	7. 1.5

5. Match the transportation systems on the right with their correct descriptions.

_____a.	1) Two insulated copper wires twisted into pairs	1. Telephone circuits/ channels
	2) Can be used across town or across country	2. Twisted pair
	3) Primary path between phones, terminals, and modems to telephone company's central office	3. Microwave
_____b.	A data transmission concept using cables made of tiny threads of glass to transmit light pulses	4. Fiber optics
_____c.	1) Also called COAX	5. Coaxial cable
	2) Insulated hollow copper cylinder containing a signal wire conductor to transmit data	6. Digital carrier
		7. Satellite

TEST

_____d. 1) High-frequency transmission signals and equipment that can transmit signals

2) Usually include line-of-sight or omnidirectional open-air transmission

3) Easily disturbed

4) Towers or tall buildings with horns or dishes are repeater stations which pick up the signal, amplify it, and pass it to the next tower

_____e. 1) A means to send signals from any sources over a signal physical channel

2) Can carry voice or data

_____f. 1) Transponders on satellites act as relay stations for uplink and downlink earth stations

2) Uplinks transmit narrow microwave beams to the satellite

3) Downlinks receive amplified signals from satellite transponders

4) Satellite's coverage area is called footprint

5) Works best in one-way transmission; for two-way there is a noticeable delay in response

_____g. 1) Telephone lines are transmission facilities within a telephone system; part of a local loop that connects a subscriber to the central office

2) Packet switching is a data transmission technique in which data messages are divided into blocks or packets of standard length, each of which has address and control information coded into it

(NOTE: If the following activities have not been accomplished prior to the test, ask your instructor when they should be completed.)

6. Survey businesses in your community to determine their use of telecommunications. (Assignment Sheet #1)

7. Design a networking system to transmit data within your school. (Assignment Sheet #2)

METHODS OF TRANSMISSION
UNIT IV

ANSWERS TO TEST

1. a. 4
   b. 3
   c. 1
   d. 2
   e. 6
   f. 5

2. b

3. a. Transmits data in only one direction; can either send or receive data but it cannot do both
   b. Transmits data in two directions but only one way at a time
   c. Transmits data in both directions simultaneously

4. a. 4
   b. 2
   c. 6
   d. 1
   e. 3
   f. 5
   g. 7

5. a. 2
   b. 4
   c. 5
   d. 3
   e. 6
   f. 7
   g. 1

6.-7. Evaluated to the satisfaction of the instructor

APPLICATIONS
UNIT V

UNIT OBJECTIVE

After completion of this unit, the student should be able to discuss the various types of applications for telecommunications and the equipment needed to accomplish the applications. Competencies will be demonstrated by completing the assignment sheets and the unit test with a minimum score of 85 percent.

SPECIFIC OBJECTIVES

After completion of this unit, the student should be able to:

1. Match types of data communications with their correct descriptions.
2. Select true statements concerning video communications.
3. Distinguish between types of audio communications.
4. Select true statements concerning graphic communications.
5. Develop a message for voice mail. (Assignment Sheet #1)
6. Develop an electronic mail message. (Assignment Sheet #2)
7. Set up a conference call. (Assignment Sheet #3)

APPLICATIONS
UNIT V

SUGGESTED ACTIVITIES

A. Obtain additional materials and/or invite resource people to supplement/reinforce information provided in this unit of instruction.

(NOTE: This activity should be completed prior to the teaching of this unit. Suggested supplemental materials are listed in Unit I.)

B. Provide students with objective sheet.

C. Discuss unit and specific objectives.

D. Provide students with information and assignment sheets.

E. Discuss information and assignment sheets.

F. Integrate the following activities throughout the teaching of this unit:

1. If equipment is available, you could do the following:

(NOTE: Refer to Handouts #1, #2, and #3.)

a. Set up a bulletin board system.

b. Upload or download files.

c. Send and retrieve a message via electronic mail.

d. Participate in a teleconference.

e. Conduct a conversation between two remote computers.

f. Send a message through a facsimile machine.

2. Take students on a field trip to view a facsimile and see the transmission process.

3. Invite guest speakers to discuss applications in their business.

4. Meet individually with students to evaluate their progress through this unit of instruction, and indicate to them possible areas for improvement.

G. Give test.

H. Evaluate test.

I. Reteach if necessary.

APPLICATIONS
UNIT V

INFORMATION SHEET

I. **Data communications**

A. Electronic mail

1. Transmits and stores messages electronically
2. Speed is a very important asset
3. Can solve time zone differences between the sender and receiver

B. Bulletin board service (BBS)

(NOTE: This service usually requires a password and account number.)

1. Is a computer information service which is accessible over various transmission systems
2. Serves microcomputer users
3. Allows users to post messages and ask for technical help and information
4. Must dial bulletin board service number, make connection, and then the bulletin board information is available

C. Real-time processing

1. Processes transactions as they occur

   EXAMPLE: Electronic funds transfer

2. Requires information to be readily available

   EXAMPLE: Seat assignment for a ticketed passenger on an airline flight

D. Teleconferencing

1. Allows group of people to meet without coming to the same location
2. Teleconferencing has three levels
   a. Public conference which is available to everyone
   b. Closed conference open only to those who know the correct password
   c. Read-only conference which allows anyone to receive it but only participants to make comments
3. Eliminates travel costs

INFORMATION SHEET

E. Bibliographic services

1. Are libraries
2. Are available most any time of the day or night
3. Allow users to use key words as part of their search to help get only useful information
4. Various services are available
   a. BRS and BRS/After Dark aimed primarily at large users
   b. Dialog is one of the largest and oldest services
   c. Dow Jones News/Retrieval is business-oriented
   d. The Source and Compu Serve are the most popular among small computer users

F. Full text

1. Presents exactly what was published
2. Is not just summaries and abstracts
3. Provides instant delivery
4. Is a newsletter in electronic form

G. File transfer

1. Allows various users to access material
2. May require an access code or password for security
3. Provides branch offices and main office with immediate information

II. Video communications

A. Allows the participants to see and hear what is happening

B. Requires special equipment which is costly

C. Satellite technology helps companies with offices around the world communicate through teleconferencing

III. Audio communications

A. Conference call

1. Allows user to talk to several people simultaneously at different locations
2. Call can be scheduled in advance with a conference operator, or can be dialed directly with an alliance bridge (700 number)

INFORMATION SHEET

3. Exact time for the call and all numbers must be given to the operator

4. Participants must be notified in advance

(NOTE: Refer to Handout #1 for steps to set-up a conference call.)

B. Voice mail

1. Allows caller to leave a message for a person who is unable to answer a telephone call

2. Sends message in analog form, converts it to digital form, and stores it in the computer's memory

3. Allows the computer to generate human-like speech through speech synthesis

IV. Graphic communications

A. Facsimile

1. Is a popular, inexpensive form of electronic mail

2. Can transmit photographic images as well as text

3. Machines on the sending and receiving ends must be compatible

4. Machine scans the page and encodes the information and sends it over the telephone lines

5. Takes very little time

6. Branch offices can have information immediately using a facsimile

B. Electronic blackboard

1. Is a special board where images can be transmitted to a screen or terminal in another location

2. Many have electronic devices which scan the information and print hard copies of the information printed on the board

APPLICATIONS
UNIT V

HANDOUT #1 — HOW TO SET UP A CONFERENCE CALL

1. Make sure you use an outside line* and:
   - Have a list of conferee telephone numbers
   - Use a touch-tone telephone with a ✱ and a #
2. Call ALLIANCE Service(s)**

   (Audio) 0+700+456-1000

   (Graphics) 0+700+456-2000
3. Enter number of locations—including yourself ☐ ☐
4. Dial a telephone number

   Domestic:

   1 + ☐ ☐ ☐ + ☐ ☐ ☐ - ☐ ☐ ☐ ☐

   International:

   0 1 1 + Country Code + City Code + Local number

   When party answers—

   Dial # to continue or ✱ to cancel
5. Dial and add other locations
6. To join conference—dial #
7. To end conference, all hang up

Courtesy of AT&T

APPLICATIONS
UNIT V

HANDOUT #2 — HOW TO SET UP REMOTE COMMUNICATIONS AND SEND A FILE TO A REMOTE COMPUTER

Read the manual of your communications software about the sending and receiving of files.

1. Make sure you have both computers and modems turned on.

2. For best results on a microcomputer for remote transmission, use the following settings for your communications software. Consult the manual of your communications software for instructions on how to set your software to these settings.

   8 data bits
   No parity
   1 stop bit
   Half duplex

3. Boot your communications software.

4. Make sure one of the remote computers is in terminal mode, ready to answer the phone.

5. Dial the remote number. The remote computer should answer the phone and establish carrier signal.

6. You should be able to type information to and from the remote computer.

   (NOTE: The half duplex setting allows you to see and receive information that you are typing.)

APPLICATIONS
UNIT V

HANDOUT #3 — HOW TO DOWNLOAD A FILE FROM A BULLETIN BOARD SERVICE

Consult the manual of your communications software for instructions on how to download (receive) a file from a host computer.

In this procedure you will be downloading a software program from a host computer, unpacking the file, and then running the program.

Most files on a bulletin board system are "packed" or "archived" in order to save disk space. These files must be "unpacked" after you download the file. If you are not adept at unpacking files, it is suggested that you contact the systems operator of the bulletin board service or a member of a local computer user group to obtain information on how to unpack files after you have downloaded the file. Some common file extensions that show packed files are:

IBM/IBM Compatibles	APPLE
Filename.ARC	Filename.BNY
	XX.filename
	Filename.pp

1. Log on to a bulletin board system and read the help file on how to download a file from that system. You may wish to turn on the test buffer and capture this information for viewing off-line.

   (NOTE: You should be sure you have set your communication software to receive files in XMODEM (or other appropriate protocol). Consult your manual for instructions on how to set your download protocol.)

2. From the main menu, locate the command to view the files that the system has in the file directories.

3. While scanning through the file directories, locate the name of a file you wish to download.

4. Use the system's appropriate command to download the file of your choice. Make sure you have a data disk so that the file can be saved to disk.

5. Unpack the file.

6. Run your program.

APPLICATIONS
UNIT V

ASSIGNMENT SHEET #1 — DEVELOP A MESSAGE FOR VOICE MAIL

NAME _____ SCORE _____

Directions: Read the following case study.

> Call Ms. Sue Jones and schedule an appointment for Thursday with her to discuss the Brown case. The meeting needs to be at 10 a.m. in your office. When you reach the company where Ms. Jones is employed, the operator puts your call through to her office. She is not available and her voice message asks you to leave a message.

In the space below, write the message you would leave on Ms. Jones' voice mail system.

APPLICATIONS
UNIT V

ASSIGNMENT SHEET #2 — DEVELOP AN ELECTRONIC MAIL MESSAGE

NAME _____ SCORE _____

Directions: Develop an electronic mail message which could be sent to branch offices in Dallas, New York, St. Louis, and Omaha requesting the following information:

1. Sales data is needed by the end of month
2. Reports should be developed listing names and total sales
3. Figures should include sales as well as returns
4. Questions should be sent to your attention

APPLICATIONS
UNIT V

ASSIGNMENT SHEET #3 — SET UP A CONFERENCE CALL

NAME _____ SCORE _____

Directions: Review Handout #1 in this unit. Then, list the steps necessary to set up a conference call to the following telephone numbers:

(213) 555-1212
(817) 555-1212
(303) 555-1212
(405) 555-1212

(NOTE: Be very specific and show the appropriate symbols.)

APPLICATIONS
UNIT V

ANSWERS TO ASSIGNMENT SHEETS

Assignment Sheet #1 — Evaluated to the satisfaction of the instructor

Assignment Sheet #2 — Evaluated to the satisfaction of the instructor

Assignment Sheet #3

1. Dial 0+700+456-1000
2. Enter 05
3. Dial 1-213-555-1212 #
4. Dial 1-817-555-1212 #
5. Dial 1-303-555-1212 #
6. Dial 1-405-555-1212 #
7. Then #
8. To end conference, all hang up

APPLICATIONS
UNIT V

TEST

NAME _____ SCORE _____

1. Match the data communications on the right with their correct descriptions.

_____a.	1) Transmits and stores messages electronically	1. Electronic mail
	2) Speed is a very important asset	2. Bulletin board service
	3) Can solve zone differences between the sender and receiver	3. Real time processing
_____b.	1) Is a computer information service which is accessible over various transmission systems	4. Teleconferencing
	2) Serves microcomputer users	5. Bibliographic services
	3) Allows users to post messages and ask for technical help and information	6. Full text
	4) Must dial bulletin board service number, make connection, and then the bulletin board information is available	7. File transfer
_____c.	1) Allows various users to access material	
	2) May require an access code or password for security	
	3) Provides branch offices and main office with immediate information	
_____d.	1) Presents exactly what was published	
	2) Is not just summaries and abstracts	
	3) Provides instant delivery	
	4) Is a newsletter in electronic form	
_____e.	1) Processes transactions as they occur	
	2) Requires information to be readily available	

TEST

_____f. 1) Allows group of people to meet without coming to the same location

2) Teleconferencing has three levels

3) Eliminates travel costs

_____g. 1) Are libraries

2) Are available most any time of the day or night

3) Allow users to use key words as part of their search to help get only useful information

4) Various services are available

2. Select true statements concerning video communications by placing an "X" in the blanks preceding the true statements.

_____a. Allows the participants to see and hear what is happening

_____b. Requires special equipment which is inexpensive

_____c. Satellite technology helps companies with offices around the world communicate through teleconferencing

3. Distinguish between audio communications by placing a "C" for conference call next to the correct characteristics.

_____a. Participants must be notified in advance

_____b. Exact time for the call and all numbers must be given to the operator

_____c. Sends message in analog form, coverts it to digital form, and stores it in the computer's memory

_____d. Allows user to talk to several people simultaneously at different locations

_____e. Call can be scheduled in advance with a conference operator, or can be dialed directly with an alliance bridge (700 number)

_____f. Allows caller to leave a message for a person who is unable to answer a telephone call

_____g. Allows the computer to generate human-like speech through speech synthesis

TEST

4. Select true statements concerning graphic communications by placing an "X" in the blanks preceding the true statements.

   a. Facsimile

   _____1. Is a popular, but expensive form of electronic mail

   _____2. Can transmit text only

   _____3. Machines on the sending and receiving ends must be compatible

   _____4. Machine scans the page and encodes the information and sends it over the telephone lines

   _____5. Takes very little time

   _____6. Branch offices can have information immediately using a facsimile

   b. Electronic blackboard

   _____1. Is a special board where images can be transmitted to a screen or terminal in another location

   _____2. All have electronic devices which scan the information and print hard copies of the information printed on the board

(NOTE: If the following activities have not been accomplished prior to the test, ask your instructor when they should be completed.)

5. Develop a message for voice mail. (Assignment Sheet #1)

6. Develop an electronic mail message. (Assignment Sheet #2)

7. Set up a conference call. (Assignment Sheet #3)

APPLICATIONS
UNIT V

ANSWERS TO TEST

1.
a.	1	e.	3
b.	2	f.	4
c.	7	g.	5
d.	6		

2. a, c

3. a, b, d, e

4.
a. 3, 4, 5, 6
b. 1

5.-7. Evaluated to the satisfaction of the instructor